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A MONOGRAPH
OF THE
NORTH AMERICAN POTENTILLEAE.

BY
PER AXEL RYDBERG.



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INTRODUCTION

The group of plants which is the subject of this treatise comprises those Rosaceous genera that usually have several free dry achenes, and styles that are articulated to the ovary and mostly dehiscent. In other words, the tribe *Potentilleae* is taken in a narrower sense than usual, and is about equivalent to the third division of the *Potentilleae* of Bentham & Hooker's *Genera Plantarum*, or to *Rosoideae*—*Potentilleae*—*Potentillinae* of Engler & Prantl's *Natuerlichen Pflanzenfamilien*.

The monograph here presented is the result of a study, not only of herbarium material, but also of living plants in the field. I have collected about half the North American species of *Potentilla*, *Argentina*, *Fragaria* and *Drymocallis*, besides the American monotypes of *Sibbaldia*, *Comarum*, *Comocarpa* and *Chamaerhodos*. The study of *Horkelia*, *Comarella* and *Stellariopsis*, all of which belong to the Pacific slope, has naturally been confined mostly to herbarium specimens. The study comprised most of the more important collections of this country, as those of Columbia University, the United States National Herbarium, Harvard University, Missouri Botanical Garden, University of Minnesota, California Academy of Sciences, Geological Survey of Canada, Iowa Agricultural College (including the Parry Collection), Lafayette College, New York Botanical Garden, College of Pharmacy of New York City, and the University of Nebraska.

I hereby extend my thanks to the directors and curators of these institutions, as well as to the following persons who have kindly loaned me their private collections or sent specimens: S. B. Parish, San Bernardino, Cal.; Thomas Howell, Clackamas, Ore.; C. F. Baker, Auburn, Ala.; Professor Aven Nelson, University of Wyoming; Geo. E. Osterhout, New Windsor, Colo.; O. A. Farwell, Detroit, Mich., and others.

To enumerate all the books referred to would be useless, as references are given under each species. They include practically all general systematic works as well as all books and other publications referring particularly to American botany. It has, however, been thought unnecessary to include purely local floras or mere catalogues of plants, but wherever a description or some interesting data regarding distribution, habitat, or other important information are found, such references are given. Wherever it has been possible, the references have been verified. Where I have not had access to the works cited, the citation is followed by an asterisk. Specimens cited but not seen by me are indicated in the same way.

It is, however, not out of place to mention the most valuable monographs and revisions of the genera. The most important are without doubt those by Dr. Christian Lehmann, of Hamburg, in his "Monographia Potentillarum" of 1820, in his "Revisio Potentillarum" of 1856, and in Hooker's "Flora Boreali-Americana." His "Revisio," an octavo of 230 pages, six tables of distribution, and 64 fine plates, will always remain one of our standard works. These, together with the following, form the basis of the present study: Nestler's Monograph of 1816, that of Seringe in De Candolle's *Prodromus* of 1825, of Torrey and Gray in their *Flora*, in 1840, of Gray in the *Proceedings* of the American Academy, Vol. 6: 1865; of Watson, in the same journal, Vol. 7: 1873; of Brewer and Watson in the *Botany of California*, Vol. 1: 1876, and of Greene in *Pittonia*, Vol. 1: 1887. To these should be added the scattered descriptions and other information in the works cited under the different species.

In the original plan I intended to include only the species native and naturalized in the United States and British North America, and these species are nearly all illustrated. As the additional North American species are not very numerous, it was thought advisable to include them also. Of the species exclusively Mexican and Central American or growing only in Greenland, as well as of a few introduced, which can scarcely be said to have established themselves, the descriptions are made somewhat shorter and printed in smaller type. None of these are illustrated.

The plates are reproduced from pen and ink drawings made by Mr. F. Emil, from herbarium specimens. The enlargements are from dissections and sketches made by the author and finished by the artist. Plate 1 is drawn entirely by me.

At first it was not intended to include the revisions of *Fragaria* and *Duchesnea*, but as these two genera are so closely related to *Potentilla*, the Monograph would seem incomplete if they were omitted. The change in the plan was, however, made so late that the illustrations could not be included; their preparation would have caused a considerable delay in the publication.

HISTORY.

The pre-Linnaean history I shall omit altogether, as the descriptions and the references to the literature of that time are in such a chaotic condition that it would be nearly impossible to write a history of any value. I refer any one interested in such a history to Pickering's "Chronological History of Plants."

The real history of botany as a science begins with the issue of Linnaeus' "Systema Vegetabilium" (1735), "Genera Plantarum" (1737) and "Species Plantarum" (1753). By these publications a foundation was laid upon which a systematic science could be

built. The gathered facts could from this time on be arranged in a system, however tentative and artificial, and be available to the scientist whenever needed.

I shall not enter into the history of the individual species at all, as this can easily be traced from the quite extensive synonymy and references given under each. I shall, however, briefly refer to the history of the genera.

Of the plants belonging to the tribe, a few were known to Linnaeus. In his "Genera Plantarum" they are described under the five genera, *Fragaria*, *Potentilla*, *Tormentilla*, *Sibbaldia* and *Comarum*.

Adanson¹ adopted Heister's name *Pancovia* for *Comarum* and Tournefort's *Quinquefolium* for the digitate-leaved *Potentillae*, reserving *Potentilla* for the pinnate-leaved ones. He inconsistently included *Tormentilla*, which has digitate leaves, in *Potentilla*, instead of in *Quinquefolium*. Since many species have digitate as well as pinnate leaves, the division of *Potentilla* into two genera on this basis is unwarranted. Adanson was followed by Gaertner,² who changed, however, *Quinquefolium* to *Pentaphyllum*. This was undoubtedly done inadvertently, as he cites Tournefort, giving the page on which *Quinquefolium* appears. Necker³ added another genus, quite as unwarranted, for the trifoliolate species, viz., *Tridophyllum*.

As far as the inclusion of *Tormentilla* in *Potentilla* (in whatever sense taken) is concerned, it may be said that it is the only proper course, and has been so regarded by nearly all botanists.

Scopoli⁴ included not only *Tormentilla*, but also *Comarum* and *Fragaria* in *Potentilla*. This view was also held by Spenner,⁵ who proposed the name *Dactylophyllum* for the group. It may be remarked here that the only logical treatment is to include also *Fragaria*, if *P. palustris*, *P. Anserina*, *P. fruticosa*, etc., are regarded as species of *Potentilla*.

Lamarek⁶ takes four species from *Potentilla*, for which he proposes a new genus *Argentina* with the following species: *A. vulgaris* (*P. Anserina* L.), *A. supina*, *A. rupestris* and *A. rubra* (*Comarum palustre* L.). All except *A. supina*, I think, should be removed from *Potentilla* for reasons given below. As *P. Anserina* is the first species given under *Argentina*, and this is an old pre-Linnaean name for that species, used in the mediæval Latin and by Ray, and others, I shall take it up as a generic name for *P. Anserina* and its allies.

Lamarek, as well as Linnæus, included in *Fragaria* some species, generally referred to *Potentilla*. Of these La Peyr⁷ made a genus *Fraga*, which was changed to *Fragarias*-

¹ Fam. Pl. 2 : 294-5. 1763.

² Fruct. 1 : 349. 1788.

³ Elem. 2 : 93. 1790.

⁴ Fl. Carn. Ed. 2, 1 : 359-363. 1772.

⁵ Fl. Frib. 3 : 1034. 1829.

⁶ Fl. Franç. 3 : 118. 1778.

⁷ Hist. Abr. Pl. Pyr. 287. 1813.*

trum by Schur.¹ As the group has no representative in America, except, perhaps, *P. ovalis* of Mexico, I have not made any attempt to investigate the validity of the genus.

Sprengel² suggests that a genus *Trichothalamus* ought perhaps to be made of the *Potentillae*, which have a long-hairy receptacle, and ends his list with *P. tridentata*. As the other species enumerated have terminal styles and are herbaceous, and Lehmann³ has taken up *Trichothalamus* as a generic name for *P. lignosa*, it is not available for *P. tridentata*. *Trichothalamus* Lehm. was changed to *Lehmannia* by Trattinnick.⁴

Bigelow⁵ proposed the genus *Bootia* for *P. arguta*. In my opinion that species, together with about a dozen others, represents a genus quite distinct from *Potentilla*, but, unfortunately, *Bootia* of Bigelow is antedated by *Boottia* of Necker.

Chamisso during his collecting in California found a plant, nearly related to *Potentilla*, but apparently distinct enough to constitute a genus by itself. It was described by him and Schlechtendal in Linnaea⁶ under the name *Horkelia Californica*. The genus was merged into *Sibbaldia* by Sprengel⁷ but soon taken out again. It has generally been regarded as a good genus by American botanists.

Thirty years later Torrey and Gray⁸ found that *H. Gordonii* and another undescribed species lacked some of the essential characters of *Horkelia*, being intermediate between it and *Potentilla* and *Sibbaldia*, and established the genus *Ivesia*. As the number of discovered species increased, the generic lines between these four genera became more and more indistinct, especially as three good *Potentillae* were described and kept in *Ivesia*, for what reason, I do not know. This led Bentham and Hooker⁹ to unite *Potentilla*, *Horkelia*, *Ivesia* and *Comarum* in one genus. This treatment was followed by Baillon¹⁰ and by Greene.¹¹

Tourreau¹² published in 1868 a catalogue of the plants that grow spontaneously along the course of the Rhone, and, in this catalogue, he divided *Potentilla* (*Sibbaldia* and *Comarum* excluded) into eight genera, viz., *Fraga*, *Trichothalamus*, *Dynamidium*, *Tormentilla*, *Chamaephyton*, *Drymocallis*, *Hypargyrium* and *Potentilla*. He gave no descriptions nor any reason for the division, but merely cited the species belonging to each. In *Potentilla* he had only one species, *P. Anserina*. As that species was removed from *Potentilla* by Lamarek, we are not obliged to adopt any of Tourreau's generic names for the large group of true *Potentillae* and rename about 200 species. The only one of his

¹ Enum. Pl. Trans. 187. 1866.*

² Anl. Kent. d. Gew., Ed. 2, 2 : 864. 1818.

³ Nov. Act. Nat. Cur. 10 : 585. 1821.*

⁴ Ros. Mon. 4 : 144. 1824.*

⁵ Fl. Bost. Ed. 2, 351. 1824.

⁶ 2 : 26. 1827.

⁷ Syst. 4 : part 2, 341. 1827.

⁸ Pac. R. Rep. 6 : 72. 1857.

⁹ Gen. Plant, 1 : 621. 1867.

¹⁰ Hist. de Plantes, 1 : 369. 1869.

¹¹ Pittonia, 1 : 95. 1887.

¹² Ann. Soc. Linn. Lyon, (II) 16 : 302-404. 1868.

nera, that, in my opinion, really deserves generic rank is *Drymocallis*. The first two may, perhaps, have some, although very slight, claim to such rank; the others, none whatever. *Drymocallis* was based upon *P. rubricaulis* Jordan, an unpublished species. Tourreau gives as a synonym, "*P. rupestris* L. ex parte." I have also found another reference which states that *P. rubricaulis* Jordan is a form of *P. rupestris*. *Drymocallis*, therefore, represents the group of plants which would have borne the name *Bootia* Bigel., if that had not been antedated, *i. e.*, *P. arguta* and its allies.

In 1829, Bunge¹ established the genus *Chamaerhodos* on those species of *Sibbaldia* that have a basal style and lack bractlets, whose leaflets are once or twice ternately divided and whose 5 stamens are antipetalous.

GEOGRAPHIC DISTRIBUTION.

Potentilla (in the broader sense) and *Fragaria* are distributed throughout the colder temperate zone of the northern hemisphere, extending far into arctic regions. Although less common, they are also found in alpine and high mountain regions of the tropics and South America. *P. anserinoides* is a native of New Zealand. *Sibbaldia* and *Comarum* grow in the arctic and colder regions of the northern hemisphere, but the former is also found on the alpine peaks of Europe, Asia and North America. *Chamaerhodos* is mainly Siberian, but *C. erecta* also grows in northwestern America. *Horkelia* (including *Ivesia*) is confined to the western part of North America. *Duchesnea* is native of Southern Asia, but is introduced into North America.

ECONOMIC VALUE.

The economic value of the plants of the tribe is not very great. Several species of *Potentilla* are more or less good pasture plants, and a few furnish honey. The root of *P. Anserina* serves as an article of food to the natives of Siberia and on the Scottish islands Tiree and Coll. The fleshy receptacle of the species of *Fragaria* (the "strawberry") is relished by people of all nations as well as by animals. The dried leaves of *P. fruticosa* are used in Siberia as a substitute for tea. The roots of *P. argentea*, *P. Tormentilla* and *Comarum palustre* are used for tanning and dyeing red. The root of *P. erecta* (*Radix Tormentillae*) is used as a powerful astringent medicine. In old time strawberries were used as a medicine for gout and other diseases.

¹ In Ledeb. Fl. Alt. 1: 429. 1829.

MORPHOLOGY.

ORGANS OF VEGETATION.

Most of the members of the tribe are perennial herbs. The perennial portion consists generally of a short ascending rootstock, densely covered with remains of basal leaves and their scarious stipules. To this is sometimes added a deep woody tap root. In species growing in arid regions the rootstock is generally very thick and woody and often much branched. Arctic and alpine species are generally caespitose. A few species of *Potentilla* are annuals or biennials with a branching root. Among ours *P. fruticosa* L. is a shrub 1-4 feet high and *P. tridentata* Ait. is also somewhat shrubby.

The flowering stem is so variable that very little may be said concerning it in this connection. In the alpine and arctic plants it is often subscapose. In *Duchesnea* and some species of *Potentilla*, the stem is prostrate and rooting. *Fragaria*, *Argentina* (*Potentilla Anserina*, *Egedii* and *anserinoides*) and sometimes *Duchesnea* produce true runners.

The inflorescence is more or less distinctly cymose. Where the stem is very leafy and the upper leaves not much reduced, the flowers become apparently axillary (the *supina* and *argentea*) groups of *Potentilla*. In *Duchesnea*, *Argentina* and the *Tormentilla* groups of *Potentilla*, the flowers are borne on long axillary pedicels.

All species, so far as I know, have stipules. Those of the basal leaves are, as a rule scarious and more or less brown; those of the stem leaves, foliaceous. In *Tomocarpa*, (*Potentilla fruticosa* and its relatives) they are all scarious and more or less sheathing.

The leaves are usually described as compound. This is, however, more or less erroneous, as the so-called leaflets are very rarely articulated to the rachis; but, on the contrary, often decurrent. Only a few, as for instance *Sibbaldiopsis* (*Potentilla tridentata*), have truly compound leaves. In this species there is an evident joint and the leaflets are tardily deciduous. As there is no name that applies to the principal divisions of a leaf divided entirely to the midrib, I am obliged to use in the descriptions the word leaflets for these divisions. For the secondary divisions, I shall use segments, lobes or teeth, according to the depth of the incisions.

In *Fragaria*, *Duchesnea*, *Sibbaldiopsis* and *Sibbaldia* the leaves are ternate. In *Chamaerhodos* they are twice ternately divided. In *Potentilla*¹ they are pinnate or digitate, with three or more leaflets. In *Comarum* and *Horkelia* (including *Ivesia*), they are pinnate and in the sub-genus *Ivesia* (except *H. Webberi*, *Baileyi* and *sarosa*) the leaflets are very numerous, small and more or less imbricated.

¹ Here as well as for the most part in the following discussion, understood in its usual extensive limitation.

FLOWER-AXIS.

The so-called calyx of the ROSACEAE and other calycifloral families consists of two distinct parts, *viz.*, the upper free portion (the sepals) which constitutes the calyx as the term is ordinarily understood, *i. e.*, the outer set of floral envelopes, and a lower, more or less cuplike portion. This has generally been regarded as the gamosepalous part of the calyx, and is so described in almost all our American systematic works. It is, however, without doubt of an entirely different origin. With the exception of, in some cases, perhaps, a very small portion at the rim of the cup (*i. e.*, just at the base of the free sepals), the whole of the so-called gamosepalous part of the calyx must be regarded as belonging to the flower-axis. This view is now held by most of the prominent systematists and morphologists in Europe as Baillon,¹ Henslow,² Wiesner³ and most of the authors of "Die Naturlichen Pflanzenfamilien," edited by Engler and Prantl, *viz.*, Engler,⁴ Focke,⁵ Gilg,⁶ Raiman,⁷ Koehne,⁸ Schimper,⁹ Niedenzu,¹⁰ and Brandis.¹¹

Some of the reasons for this view are as follows :

1. The petals and stamens, which are generally regarded as homologues of foliage leaves, are borne on the margins of the cup inside the calyx-lobes. If the cup is to be regarded as the lower part of the united sepals, one set of phyllomes would be borne on the upper surface of another set, which would be a very unnatural condition according to our general conceptions. If the cup is regarded as a modified flower-axis, the explanation of the arrangement of stamens, petals and sepals is very simple.

2. If the cup is regarded as the result of the adnation of the lower portions of the sepals, petals and stamens, the difficulty is not removed. The petals fall off by a joint at their insertion at the margin of the cup. This point should either be the lower end of the petiole or else the petal should represent only the leaflet of a unifoliate leaf. In the first case it would be borne on the calyx as above. In the second case, the difficulty would be that the leaflets in *Potentilla* and most genera are not deciduous, nor even jointed to the rachis. We should also find a continuation of the leaf downward representing the rachis. There is a kind of continuation in the form of a fibro-vascular bundle, but this unites with those from the antipetalous stamens before it reaches the bottom of the cup. So also the fibro-vascular bundles of the sepals unite with those of the antisealous stamens. If the three sets of organs were completely united and all

¹ Histoire des Plantes, 1 : 315-6.

² The Origin of Floral Structures, 96.

³ Elem. Wiss. Bot. 2 : 307.

⁴ Vol. 3 : part 2 a, 41 (Saxifragaceae).

⁵ Vol. 3 : part 3, 4 (Rosaceae.)

⁶ Vol. 3 : part 6 a, 100 (Loasaceae).

⁷ Vol. 3 : part 7, 199 (Onagraceae).

⁸ Vol. 3 : part 7, 1 (Lythraceae).

⁹ Vol. 3 : part 7, 42 (Rhizophoraceae).

¹⁰ *l. c.* 57 (Myrtaceae).

¹¹ *l. c.* 106 (Combretaceae).

inserted on the end of the pedicel at the bottom of the calyx, we would have the rather absurd condition either that fibro-vascular bundles of two sets of leaves (petals and stamens, or sepals and stamens) of different ages would be united in the organs themselves, or else that the stamens were borne on the other organs, just as in the first case, only that the insertion would be a little farther down. If the attachment of the stamens, petals and sepals is supposed to be at the place where the fibro-vascular bundles separate, the axial portion would end at different heights (*i. e.*, both at **us** and **up**, plate 1, fig. 3) and still a portion of the axis would be cup-shaped. It is, therefore, best to regard the whole of the cup axial. In this case the union of the fibro-vascular bundles below the margin causes no difficulty as fibro-vascular bundles from leaves often unite with other bundles in the stem.

3. The axial origin of the cup is shown by the fact that, in *Rosa* and other genera, it often bears bracts, indeed sometimes fully developed leaves with stipules even at a place much higher than the insertion of the achenes, and both Masters and Henslow state that supernumerary carpels are sometimes borne on its rim in the hawthorn.

4. The real place of insertion of the sepals is at or at least near the brim of the cup, just below the place of insertion of the petals. This is shown by the fact that in *Rosa* the sepals, which in this genus are often leaf-like, sometimes bear at this point fully developed stipules. The bractlets of the *Potentilleae* have usually been regarded as representing the united stipules of two neighboring sepals. Another fact, indicating that the point of insertion is at the place given above, is that in some species of *Rosa* and other genera the sepals are deciduous at this point. Even in most of the *Potentilleae* this place is also shown by a thickening of the tissue. This is most prominent in *Horkelia* (*Ivesia*) *Baileyi*, *Shockleyi*, *pygmaea* and *Comarella multifoliolata* and *sabulosa*, where, especially at the time when the fruit is ripe, there is a considerable swelling and a decided break in the outline, the sepal making nearly a right angle with the axial portion.

The flower-axis can therefore be divided into two portions; an inner of terminal and an outer of lateral origin. The inner portion in the *Potentilleae* is typically more or less conic or hemispheric, bearing the numerous pistils, which are generally interposed with numerous longer or shorter bristles. For convenience I shall use in my descriptions the word receptacle exclusively for this portion of the axis. In *Ivesia*, etc., where the number of pistils is very small, the receptacle is very minute and in several cases obsolete. In *Fragaria*, *Duchesnea* and *Comarum* it much enlarges in fruit. In the first genus it becomes fleshy and edible and constitutes the strawberry.

The outer portion of the flower-axis is, as stated before, lateral and develops in

somewhat the same way from the lateral portion of the axis as the integuments of the seed do from the funiculus. It begins as an annular thickening some distance below the apex of the axis; this thickening enlarges in *Fragaria*, *Comarum*, *Argentina*, *Sibbaldia* and several *Potentillae* and *Ivesiae* to a nearly flat disk, bearing the bractlets, sepals, petals and stamens on its margin. More commonly, however, the margin curves upward and the disk becomes cup-shaped, campanulate or turbinate (in other tribes even tubular), enclosing the receptacle with its pistils and often exceeding it in height.

As the epidermal tissue of the outer or lower surface of this cup is nearly the same in structure as that of the bractlets and sepals, it has usually been regarded as a part of the calyx. This view, although erroneous, is still adhered to in all our American works on descriptive botany. There is no need, however, of perpetuating a faulty application of the term calyx and I shall not use it in the sense given. As the term *receptacular cup* (or if elongated, *receptacular tube*), which expresses the correct idea, is very inconvenient in descriptions and almost wholly unknown to American botany,¹ I shall adopt, in my descriptions, for convenience, the shorter term *hypanthium* for the cuplike expansion of the flower-axis and designate the free leaves of the outer set of floral envelopes by the word sepals.

The inner surface of the hypanthium is covered with a more or less glandular tissue, which is generally thickened where the stamens are inserted. In *Fragaria*, *Potentilla*, etc., the distance between the base of the receptacle and the stamens is very small, while in *Horkelia* (including *Ivesia*) these are quite removed from each other.

FLORAL ENVELOPES.

The sepals are in most species normally five in number, but in a few only four; they are inserted on the outer margin of the cup, as stated above, and more or less imbricated in the bud. Outside of the sepals and alternate with them, in all genera of the tribe, except *Chamaerhodos*, there is a set of similar often smaller organs, usually called bractlets. They have been regarded as representing a set of bracts, also united with the sepals or else a set of outer floral envelopes, an outer calyx. The view now most commonly held is that each represents two united stipules as often found in opposite or whorled leaves.

The petals are of the same number as the sepals and alternate with them. They are inserted in the angle between the sepals and slightly inside the same. If the stamiferous disk is thickened their insertion is just under its margin.

The form of the petals is variable. In *Potentilla* proper they are most commonly

¹ So far as I know, no one in America has used the term, except myself in the Flora of Nebraska, part 21.

obcordate; in *Fragaria*, *Duchesnea*, *Potentilla arguta*, *fruticosa* and *tridentata* and their allies nearly orbicular; in *Horkelia* proper, cuneate-obcordate or nearly strap-shaped; in *Ivesia*, *Sibbaldia* and *Chamaerhodos* spatulate or obovate, in *Comarella* (*Ivesia depauperata* and *I. subulosa*) narrowly linear, and in *Comarum* ovate and long-acuminate.

The color is also variable; white in *Fragaria* and some species of *Potentilla* and *Horkelia*; yellow in *Sibbaldia*, most *Potentillae* and some *Horkeliae*, and dark red or purple in *Comarum* and *Comarella* and some species of *Potentilla*.

STAMENS.

The most common arrangement of the stamens met with in the tribe is twenty in three series (See plate 1, fig. 9). The outer series consists of ten stamens, placed two and two inside each petal. These are designated as *parapetalous* stamens (**pp**) by Alexander Dickson.¹ The other two series consist each of five stamens, in the one placed right opposite the petals (*antipetalous* stamens, **ap**) and in the other opposite the sepals (*antisepalous* stamens, **as**). In *Potentilla* the antisepalous stamens are generally the innermost, a fact that seems rather strange on a casual observation. The contrary would rather be expected. One would rather expect that the different series would follow each other in the following order: bractlets, sepals, petals, antisepalous stamens, antipetalous stamens and the different series of pistils. This is also the order in the *Horkeliae* with 10 stamens. In the *Horkeliae* with twenty stamens (*Ivesia*) the antipetalous stamens are also the innermost, as they should be (fig. 8.) Why should not the same be the case in *Potentilla*? A further investigation shows that the antisepalous stamens, as a rule, are the largest and the antipetalous the smallest. By examining the opening buds it is easily seen, that the order in which the stamens develop is as follows; first the antisepalous, then the parapetalous, and lastly the antipetalous stamens, *i. e.*, the inner, outer and middle most commonly in *Potentilla*, the middle, outer and inner in *Horkelia* (including *Ivesia*). The conclusion is that the antisepalous stamens, being the older, must really belong to a series outside that of the antipetalous ones. Their place inside must be explained in the following way: In *Potentilla* the staminiferous disk is always more developed at the points where the petals are attached, making the disk more or less pentagonal in outline. The expansion of the disk at the five corners has naturally carried the antipetalous stamens farther out so that they are in the same periphery as the antisepalous stamens or even are carried beyond the same. In *Horkelia* where the disk is obsolete and has about the same development all around, the antipetalous and antisepalous stamens remain in their proper relation.

¹ Seemann, Journal of Botany, 4: 275.

The parapetalous stamens must be regarded as abnormal supernumerary parts, very common in the ROSACEAE and rather characteristic. Any theory as to their origin can be only a matter of speculation. I have seen no explanation given. As stated above, many authors have regarded the bractlets as representing the united stipules of two adjacent sepals. This suggested to me that the parapetalous stamens might have the same relation to the antipetalous stamens as the bractlets have to the sepals, only with the difference that they have remained free. Their position, viz., one on each side and a little outside of the antipetalous stamens, is the one to be expected of such modified stipules. Acting on this suggestion, I traced the fibro-vascular bundles of those stamens in *Horkelia sericoleuca*, *Pickeringii* and *argyrocoma* and found that they united with those of the nearest antisepalous stamens (these species have parasepalous instead of parapetalous stamens) before they reached the bottom of the calyx, as shown in plate 1, fig. 3, **us**. This fact would suggest that they represent in a certain way the stipules of the antisepalous stamens. The fact that they develop before the antisepalous stamens is also parallel to the earlier development of stipules.

In several species of *Potentilla* with 30 stamens as for instance, *P. recta* and *subphurea* (fig. 14), the additional series of 10 stamens (**ps**) have exactly the same position relative to the antisepalous stamens (**as**) as the outer series of 10 parapetalous (**pp**) stamens has to the antipetalous stamens (**ap**). That would mean that not only the antipetalous but also the antisepalous stamens had stipules. There is, however, another explanation, perhaps neither better nor worse, viz., that the antipetalous stamen and its two neighboring parapetalous stamens represent a trifoliate leaf. The *Horkeliac* with 20 stamens have apparently parasepalous instead of parapetalous stamens (fig. 8).

It must be remembered that the presence of supernumerary stamens is not uncommon. Such a condition is often found in the antipetalous and antisepalous stamens, so that two stamens instead of one are found opposite one or more petals or sepals. The parapetalous (and parasepalous, if present) are seldom duplicated in flowers with less than 30 stamens. There are very few species of *Potentilla* that have a greater number, and in such cases it is nearly impossible to make out the arrangement. Of the North American species most have about 20, some as many as 30, and one Mexican species about 40 stamens.

Many species of the tribe have fewer than 20 stamens. In such cases it is generally the parapetalous series that first disappears. The number then becomes 10, as commonly in *Potentilla rivalis*, *P. leucocarpa*, *P. biennis* (Fig. 10) and *Horkelia* (*Ivesia*) *pygmaea*. If further reduction occurs, which is even more common, the antipetalous stamens are also lacking and the androecium is represented by the 5 antisepalous

stamens, as, generally in *Potentilla pentandra*, *Horkelia Gordonii*, *H. Shockleyi*, *H. Baileyi*, *H. lycopodioides*, *Comarella multifoliolata* (Fig. 12), *C. sabulosa* and *Sibbaldia procumbens*. *Chamaerhodos* is an exception to the rule (Fig. 11) in which the androecium consists of the 5 antipetalous stamens. *Stellariopsis santolinoides* (Fig. 15) has always only 15 stamens and *Potentilla Monspeliensis* sometimes that number. In both the antipetalous stamens are then lacking. In the former species they are represented by a thickening of the tissue at the base of the parapetalous stamens.

There is, however, within the tribe *Potentilleae* also another arrangement of stamens widely different from the one described above. (See Figs. 1 and 13.) My attention was called to it especially in 1896 while studying a new species, *P. convallaria*, nearly related to *P. arguta* and *P. glandulosa*. It may be described as follows: The margin of the disk is very thick; this collar-like rim (Fig. 1) is pentagonal in outline, with one petal (**p**) fastened at each corner; in cross-section the collar is nearly semicircular and bears on its upper surface 20 to 30 stamens; these are not arranged in definite series, but form concave arches (Fig. 13, **fs**) between the bases of the petals; the number of stamens in each is very variable, being 4, 5 or 6 in each arch in the same species or even in the same flower. The stamens on each side of the bases of the petals are the oldest, then the ones next to them, etc. Those opposite the sepals (**as**, Fig. 13) are, therefore, the youngest, a condition entirely contrary to that found in the other *Potentilleae*. It was this peculiar structure, although not well described by him, that led Bigelow to make *Potentilla arguta* the type of a new genus, *Boottia*. One of our recent botanists, in a paper published a few years since, slightly ridiculed Bigelow for so doing, saying: "What a genus!" It must be admitted that the above mentioned peculiarity alone would scarcely warrant the exclusion of the species in question from *Potentilla*. There are, however, other characters, more important, which I shall discuss later, that in my opinion fully warrant such an exclusion.

Alexander Dickson¹ gives an interesting discussion of a similar arrangement of the stamens in *P. fruticosa*, in which the festoons generally contain 5 stamens; he explains the arrangement in the following words: "As I am unable to conceive of any possible explanation of such a festooned arrangement of stamens, unless we view the androecium here as consisting of five compound and confluent stamens, the terminal lobe of each such stamen being developed as a petal, so-called. When there are five stamens in the festoon, the central stamen must be regarded as an interstaminate lobe, analogous to the interpetiolar stipules—to the intersepaline lobes in some species of *Campanula*, in *Nemophila*, and in *Potentilla* itself (the so-called epicalyx), or the interpetaline lobe of the corolla of *Soldanella*."

¹ Seemann, Journ. Bot. 4: 273-281.

This explanation seems to me rather unsatisfactory, but I am unable to give any other in its place. Dickson states that he had found the same arrangement in the European *P. rupestris*. I have confirmed Dickson's observations in both species and find that *P. fruticosa* has the same arrangement of stamens as *P. arguta*, *P. glandulosa* and their relatives, but the thickening of the disk is less prominent. *P. rupestris* belongs to the same group as *P. arguta*, and all species of that group and *P. fruticosa* and a few closely related Asiatic ones have the same arrangement, but as far as I know it is not found elsewhere in the tribe. In the dark red-flowered *Potentilla*, the disk is somewhat thickened but the arrangement of the stamens is normal.

In the two groups with festooned stamens, the anthers are also of different form from those of the rest of the tribe, being flat, scarcely at all didymous, oval in outline, in some species only slightly cordate at the base, with filaments attached to their backs the sacs opening by a slit along the margin. The other species have as a rule anthers that are more or less didymous and open by a slit which is more or less on the inside. The most remarkable exception is *Stellariopsis santolinoides* in which the anthers are decidedly didymous, each half nearly pear-shaped and opening by a subterminal pore (Plate 95).

In most plants belonging to the tribe the filaments are slender and filiform but in *Horkelia* they are dilated and more or less petaloid (Plates 56-81). In most they are broad, in some even triangular in outline, but in others, as for instance, *H. tridentata* (Plate 74) and *congesta* (Plate 76), they are rather narrow and lanceolate. One undescribed species of the subgenus *Ivesia* (Plate 84) has also somewhat dilated but narrow filaments.

PISTILS AND FRUIT.

The ovary is one-ovuled and becomes an achene. In its form there is very little variation, at least in the North American species. Nearly all the members of the tribe have somewhat obliquely inverted pear-shaped and slightly flattened smooth and glabrous achenes. The only one that in form departs considerably from the usual type is *Potentilla Anserina* in which the achene is much thickened at the upper end, and there obtusely triangular in cross-section, and has a very thick and corky shell. In *P. paradoxa* (Plate 5) and *P. Nicolltii* (Plate 6), the achene has a large gibbosity on the inner margin. In *P. Monspeliensis*, *P. Canadensis* and *P. ramulosa* the achenes are somewhat ribbed and in several others more or less veined. In *P. sulphurea* they are strongly reticulated. In *P. fruticosa* and *P. tridentata* they are hairy, in all the other species glabrous.

The form of the style is somewhat various. In most species this organ is very slender and filiform; in many, however, it is more or less thickened below by a glandular tissue. In *P. arguta* and its relatives it is thickened near the middle and also glandular. In *P. fruticosa* (Plate 101) and a few Asiatic species, it is club-shaped, that is glandular at the top and in that species the stigma is unusually prominent and slightly 4-lobed. In all the others it is rather inconspicuous.

In the tribe the style is more or less constricted at the point of attachment to the ovary and usually deciduous sooner or later. The point of attachment is very variable and evidently of great importance. In all species of *Horkelia*, *Ivesia* and most included in *Potentilla*, the style is inserted nearly at the apex of the ovary. (Plate 1, Fig. 6.) In *Sibbaldia*, *Fragaria*, *Comarum*, *Potentilla Anserina* (Plate 1, Fig. 7), *P. Egedii*, *P. fruticosa* and *P. tridentata* the style is lateral, and in *Chamaerhodos* and *P. arguta* and its allies (Plate 1, Fig. 5), it is attached to the ovary very near its base. In all cases where the style is terminal the seed is also pendulous and anatropous (Fig. 6); where the style is lateral the seed is ascending and amphitropous (Fig. 7); and where the style is nearly basal the seed is ascending and orthotropous (Fig. 5).

The number of pistils is very variable. In most of the members of the tribe, the pistils are more than 20 (Plate 1, Figs. 9, 10, 13 and 14), in some very numerous, but in *Sibbaldia*, *Chamaerhodos* (Fig. 11), *Ivesia* (Fig. 8) and one or two *Potentillae*, they are from 3-15, in *I. depauperata* (Fig. 12) and *I. sabulosa* 2, and in *I. santolinoides* (Fig. 15) only 1.

RELATIONSHIP OF THE TRIBE.

As stated before, the so-called gamosepalous part of the calyx is to be regarded as an expanded flower-axis. Having this fact in mind, it is easy to see that the flower of *Potentilla* does not differ very much from that of *Ranunculus*. The main difference is that in the latter, where the flower-axis is not expanded laterally, the stamens, petals and sepals are borne right under the pistils, while in the ROSACEAE they are perigynous or epigynous. The organs of vegetation and the other floral characters of *Ranunculus* and *Potentilla* are so similar that an ordinary observer easily mistakes one for the other or regards them as belonging to the same genus. It is evident that the RANUNCULACEAE and ROSACEAE are very nearly related, and of the genera belonging to the latter, it is questionable which should be regarded as standing nearest RANUNCULACEAE, *Potentilla* or *Geum*, especially the group containing *G. Rossii* (R. Br.) Ser. and *G. turbinatum* Rydb.

Through *Waldsteinia*, the tribe connects with the DRYADEAE, through *Fragaria* and

Dalibarda with RUBEAE, through *Chamaerhodos* and *Alchemilla*, with SANGUISORBEAE, etc. The relation of the tribes of ROSACEAE may be represented in the following diagram :

SAXIFRAGACEAE.

POMACEAE.

DRUPACEAE.

SPIRAEAE.

CERCOCARPEAE.

ROSEAE.

DRYADEAE.
(*Waldsteinia*.)

RUBEAE.
(*Dalibarda*.)

SANGUISORBEAE.
(*Alchemilla*.)

POTENTILLEAE.

RANUNCULACEAE.

LIMITATION OF GENERA.

As stated before, *Comarum*, *Sibbaldia*, *Horkelia* and *Iresia* have been included in *Potentilla* by Bentham and Hooker, Baillon, Greene and others. The only logical course to be taken would have been to include also *Duchesnea* and *Fragaria*. The latter differs

from such species as *P. sterilis* and *P. ovalis* only in the receptacle, which becomes fleshy in fruit. The characters that distinguish *Duchesnea* from *Potentilla* are still less marked, viz., the enlarged and red-colored receptacle. Since in *Comarum*, which is included in *Potentilla* by these authors, the receptacle also enlarges, the only remaining character would be the red coloring.

Professor Greene¹ when carrying out in practice what was suggested by Bentham & Hooker and Baillon, and renaming the known species and describing several new ones, in his introduction pointed out the great variety in habit in the genus *Potentilla*, using *P. Anserina*, *P. fruticosa* and *P. arguta* as good illustrations. He also showed that *Horkelia*, *Sibbaldia* and *Ivesia* did not differ more in habit from *Potentilla* than the species mentioned differed from each other and from others of the genus. He was perfectly right in this view. For my part I think that those three species differ in essential characters more from each other and from *Potentilla* proper, than do *Sibbaldia*, *Horkelia* and *Ivesia*, especially the latter. I should regard them as the types of three good genera. Among other characters separating them from *Potentilla* is a different position of the style, a character which even in ROSACEAE is taken as the principal distinction between the tribes PRUNEAE and CHRYSOBALANEAE.²

Only two courses can logically be taken. Either the whole tribe, *Fragaria* also included, must constitute a single genus, or else both *Potentilla* and *Ivesia* be divided into several genera. I have taken the latter course, for the following reasons :

1. Nature was not made to order so as to fit a special human system, and the lines between genera or species are seldom as well marked in nature as the scientist wishes they were, or even as he draws them. Nearly everywhere in nature there are found intermediate forms even between genera. The larger these are and the more characters are used to distinguish them, the more such intermediate forms there will be found. There is, therefore, a tendency among both botanists and zoölogists to acknowledge many and small genera, based on few, or even single characters. Each genus will then consist of only such forms as are very closely related and the system will gain in clearness.

2. *Potentilla* has already too many species to be handled conveniently and still more are discovered every year. It would, therefore, be well to divide it simply for convenience.

3. The genus *Potentilla*, in its broader sense, contains plants of so many different types that it can scarcely be regarded as a systematic unit of the rank that is called a genus in general or as analogous to the genera *Fragaria*, *Rosa*, *Rubus*, and *Dalibarda*.

¹ Pittonia, 1 : 97-106.

² These tribes are now regarded by many as good families.

4. The genera here proposed would, under all circumstances, be treated at least as subgenera under *Potentilla*, just as some of them were treated by Torrey and Gray in their Flora. If they can be characterized and distinguished from each other as subgenera, there is no reason for withholding from them generic rank, and the classification will be much simpler.

5. As far as our American species are concerned the genera proposed here are well defined and can be readily separated by their general habit as well as by their floral characters.¹ They can be distinguished from the others much more readily than *Ivesia* can from either *Horkelia* or *Potentilla*.

Potentilla arguta and its allies differ from *Potentilla* proper by the nearly basal style, ascending and orthotropous seeds, the flat disk-like anthers, the arrangement of the stamens in five festoons, and in general habit.

Potentilla tridentata differs by the lateral style, hairy achenes, ascending and amphitropous seeds, shrubby habit, and leaflets that are jointed to the rachis and at last deciduous.

Potentilla fruticosa and some Asiatic species differ by the same characters as the last (except the leaves), by the arrangement of the stamens in five festoons, and the scarious more or less sheathing stipules.

Potentilla Anserina, *Egedii* and *anserinoides* by the lateral style, thick corky achenes, ascending and amphitropous seeds, and (at least from all American *Potentillae*) by the fact that they propagate like *Fragaria* by true runners.

Ivesia depauperata and *I. sabulosa* differ from all the other *Ivesiae* by their narrowly linear petals, the two pistils and the peculiar structure of the hypanthium, described later.

Ivesia santolinoides differs by its anthers, which are obcordate and open by a sub-terminal pore, by the *Potentilla*-like flowers, solitary style and the general habit and peculiar leaves.

When comparing the original species of *Horkelia* and *Ivesia*, viz., *H. Californica* Cham. & Schlecht, and *I. Gordonii* (Hook.) T. & G. with each other and with a typical *Potentilla*, no one would hesitate to call them good genera. There are, however, species so intermediate between *Ivesia* and the other two genera, that the differences are nearly obliterated. This is especially the case with the distinctive lines between *Ivesia* and *Horkelia*. *Horkelia tridentata*, *H. congesta* and *H. Howellii* have only 4-15 pistils and the two first only slightly dilated filaments. This is also the case with my *H. argyrocoma*, which is in all respects a good *Ivesia*, belonging to the same group as *I.*

¹ Three of them were recognized by Torrey and Gray as subgenera.

Pickeringii. It is true that *H. argyrocoma* differs from the three *Horkeliae* mentioned by the number of stamens, which is 20; but there are two species of true *Horkeliae* with numerous pistils that also have 20 stamens, viz., *H. purpurascens* and *H. pinctorum*. The characters which have been used to separate *Horkelia* and *Ivesia*, viz., the number of stamens and pistils and the dilated filaments in *Horkelia*, fail altogether. The numerous and more or less imbricated leaflets generally found in the *Ivesiae*, is a character lacking in *I. Baileyi*, but found in *H. sericata* and *H. Howellii*, which are in other respects good *Horkelias*. I have, therefore, come to the conclusion that it is best to unite the two genera. The characters that have been used to separate *Ivesia* from *Potentilla*, viz., the fewer number of pistils in the former, is, of course, of no value. *Ivesia pygmaea* Gray has very often as many as 20 pistils, while such species as *Potentilla Coloradoensis* has often not more than 12 or 15, and *Ivesia Lemmonii*, which is a good *Potentilla* and should be transferred to that genus, seldom has that many.¹ There is, however, another character that can serve very well to distinguish *Ivesia* as well as *Horkelia* from *Potentilla*. The character was partly used in the original description of *Horkelia*, in which the dilated stamens were not referred to. In *Potentilla* the stamens are inserted in the bottom of the hypanthium, very near the base of the receptacle, and at their bases there is a more or less distinct, annular and somewhat glandular thickening of the tissues. In *Horkelia* (with *Ivesia* included), the insertion of the stamens is farther out from the center of the hypanthium, so that there is a large open space between the base of the receptacle and the stamens, and there is no trace whatever of a thickening (except perhaps in *H. saxosa* from Lower California). As *Horkelia* (*Ivesia* included) is a genus characteristic of the drier regions of the North American Pacific slope, it is well to keep it separate from *Potentilla*, even if the distinctive characters are not very prominent.

LIMITATION OF SPECIES.

It will be seen from the following that my opinion as to the limitation of species differs widely from that expressed in our manuals and from that of Dr. Watson in his Revision.² As there is a tendency to acknowledge many and small genera, so is there also a tendency among botanists to admit many more species than was customary only a few years ago. My conception of a species agrees in the main points so far as *Potentilla* is concerned with that of Lehmann, as expressed in his Revision of 1856. In *Horkelia*

¹ *P. Newberryi* Gray (*Ivesia gracilis* T. & G.) and *P. Arizonae* Greene (*I. pinnatifida* Wats.), are typical *Potentillae*, and were described in the wrong genus.

² Proc. Am. Acad. 8: 549-573.

my specific lines are nearly the same as those of Professor Greene.¹ In addition I have described a few new species and have made a few necessary changes.

KEY TO THE GENERA.

Style terminal or nearly so ; ovules pendulous and anatropous.

Hypanthium saucer-shaped to deeply campanulate ; petals oblanceolate to obovate.

Anthers oblong, opening by longitudinal slits ; pistils several to many, very rarely one.

Stamens inserted very near the base of the receptacle on a more or less evident annular thickening.

1. *Potentilla*.

Stamens separated from the receptacle by a wide open space ; no indication of an annular thickening.

2. *Horkelia*.

Anthers obovate, opening by subterminal pores ; pistils 1.

3. *Stellariopsis*.

Hypanthium wheel-shaped ; petals narrowly linear ; pistils 2.

4. *Comarella*.

(Style terminal, ovules basal, erect.

Waldsteinia.²)

Style lateral ; ovules ascending and amphitropous.

Achenes glabrous ; herbs.

Achenes numerous ; stamens 20.

Receptacle not enlarged in fruit ; leaves interruptedly pinnate ; flowers yellow.

5. *Argentina*.

Receptacle in fruit somewhat enlarged and spongy ; leaves pinnate ; petals red.

6. *Comarum*.

Receptacle much enlarged and red in fruit ; leaves trifoliolate.

Receptacle not pulpy ; petals yellow.

7. *Duchesnea*.

Receptacle pulpy, edible ; petals white or pinkish.

8. *Fragaria*.

Achenes 10-15 ; stamens 5 ; leaves trifoliolate.

9. *Sibbaldia*.

Achenes hairy ; shrubs.

Leaves trifoliolate ; style filiform ; flowers white.

10. *Sibbaldiopsis*.

Leaves pinnate ; style club-shaped ; flower (in ours) yellow.

11. *Comocarpa*.

Style nearly basal ; ovules ascending or nearly erect, orthotropous.

Stamens and pistils numerous ; bractlets present ; leaves pinnate ; flowers large.

12. *Drymocallis*.

Stamens 5 ; pistils 5-10 ; bractlets not present ; leaves twice ternate ; flowers small.

13. *Chamaerhodos*.

¹ Pittonia, 1: 95-106.

² *Waldsteinia* and the Siberian *Coluria* are sometimes placed in the *Potentilleae* on account of the styles which are articulated to the ovary, sometimes in the *Dryadeae* on account of their basal erect ovules.

POTENTILLA L.

Potentilla L. Sp. Pl. 495. 1753.

Tormentilla L. Sp. Pl. 500. 1753.

Quinquefolium Tournf. ; Adans. Fam. 2 : 295. 1763.

Pentaphyllum Gaertn. Fruct. 1 : 349. 1788.

Tridophyllum Neck. Elem. 2 : 93. 1790.

Fraga La Peyr, Hist. Abr. Pl. Pyr. 287. 1813.

Trichothalamus Sprengel, Anl. Kent. d. Gew., Ed. 2, 2 : 864. 1818.

Dactylophyllum Spenn. Fl. Frib. 3 : 1034 (in part). 1829.

Potentillopsis Opiz, in Lotos, 7 : 30. 1857.

Fragariastrum Schur, Enum. Pl. Trans. 187. 1866.*

Chamaephyton Tourr, Ann. Soc. Linn. Lyon (II) 16 : 371. 1868.

Dynamidium Tourr. l. c.

Hypargyrium Tourr. l. c.

Hypanthium concave, mostly hemispheric. Bractlets, sepals and petals 5 (sometimes 4), the latter deciduous, obcordate, obovate, rotund or cuneate, as a rule not unguiculate, obtuse or emarginate, yellow, white or dark purple. Stamens most commonly 20, in three series, viz., 10, 5 and 5 respectively, sometimes more, sometimes fewer, inserted not very far from the receptacular column ; anthers generally more or less didymous ; filaments filiform or subulate, not flattened or dilated. Receptacle hemispheric or conic bearing numerous pistils (in *P. Lemmonii* only 5–10, in a few others 10–20). Style often long and filiform, often short and thickened at the base, always attached near the apex of the ovary, articulated to it and deciduous. Seeds inserted near the base of the style, pendulous and anatropous.

Potentilla comprises over 200 species, distributed throughout the colder part of the north temperate zone, extending far into the arctic, and through alpine regions of the tropics and South America. There is a great variation as to size and general habit within the genus ; some species attain a height of half a meter or more, while others are only a few centimeters in height. The leaves are pinnate as well as digitate, sometimes even in the same species, and the number of leaflets vary from 3 to 27, but are not imbricated in any of the North American species.

As the genus is very large, and very variable as far as the organs of vegetation are concerned, I have tried to divide it into natural groups, named from a representative species. As the groups are often confluent and some species could be placed with almost equally good reason in two groups or more, the key to these groups, as well as to the spe-

cies, must naturally be more or less artificial. In many cases the species are very closely related, without many well-marked distinguishing characters and the differences are brought out better in the general description than can be done in the artificial key.

KEY TO THE GROUPS.

- | | |
|--|--------------------------|
| Flowers dark red or dark purple. | 1. <i>Haematochri.</i> |
| Flowers yellow or whitish. | |
| Flowers solitary, axillary, on long pedicels. | 2. <i>Tormentillae.</i> |
| Flowers many in very leafy cymes. | |
| Bractlets 3-toothed. | 3. <i>Heterosepalae.</i> |
| Bractlets entire. | |
| Annuals or biennials or short-lived perennials ; style fusiform. | 4. <i>Supinae.</i> |
| Perennials ; style filiform but short. | 5. <i>Argenteae.</i> |
| Flowers cymose, but cymes not very leafy, generally rather few-flowered. | |
| Leaves digitately 5-9-foliolate. | |
| Plants less than 2 dm. high. | |
| Leaves tomentose, at least beneath. | 6. <i>Concinnae.</i> |
| Leaves not tomentose. | |
| Stem spreading, with many branches ; sepals and bractlets incurved in fruit. | 7. <i>Subviscosae.</i> |
| Stem simple, erect, few-flowered ; sepals and bractlets not incurved. | 8. <i>Aureae.</i> |
| Plants more than 2 dm. high. | 9. <i>Graciles.</i> |
| Leaves digitately 5-foliolate with an additional pair of smaller leaflets on the petiole or with the middle leaflet petiolate. | 10. <i>Subjugae.</i> |
| Leaves digitately 3-foliolate. | |
| Sepals 3-toothed ; petals white. | 11. <i>Ovales.</i> |
| Sepals entire ; petals yellow. | |
| Leaves not tomentose. | |
| Leaflets merely toothed. | 12. <i>Frigidae.</i> |
| Leaflets divided to near the base into 2-3 entire segments. | 13. <i>Biflorae.</i> |
| Leaves more or less tomentose beneath. | 14. <i>Niveae.</i> |
| Leaves pinnate. | |
| Style not longer than the mature achene, thickened and glandular below (except in <i>P. multifida</i>) ; leaves usually more or less tomentose beneath. | 15. <i>Multifidae.</i> |
| Style much longer than the mature achene, filiform. | |
| Leaves with 1-3 more or less approximate pairs of leaflets. | |
| Leaves more or less tomentose beneath. | 16. <i>Rubricaulae.</i> |

- Leaves not at all tomentose.
- Style subterminal. 8. *Aureae*.
- Style attached below the apex of the achene. 17. *Brevifoliae*.
- Leaves with 3-13 pairs of leaflets.
- Leaves green on both sides.
- Petals yellow ; bristles of the receptacle not unusually long. 18. *Multijugae*.
- Petals white ; bristles of the receptacle very long. 19. *Arenicolae*.
- Leaves grayish or whitish silky, or tomentose, at least beneath.
- Leaflets toothed or incised. 20. *Leucophyllae*.
- Leaflets dissected into linear segments. 21. *Candicantes*.

§ 1. HAEMATOCHELI.

Petals dark red or dark purple, broadly obcordate, rather large and showy ; stamens mostly 20, in 3 series on the very thick and swollen, red or purple margin of the disk, the antisepalous stamens generally larger and with thicker filaments.

The group consists of two species growing in southwestern United States and northern Mexico, four in Mexico, and a few in India, among others *P. Nepalensis* and *P. atrosanguinea*, which are sometimes cultivated.

Leaves digitate.

- Leaves glabrate, without tomentum. 1. *P. Thurberi*.
- Leaves glabrate or appressed silky above, more or less white tomentose beneath.
- Leaflets obovate to oblanceolate, serrate. 2. *P. atrorubens*.
- Leaflets oblong, crenate above the middle. 3. *P. fusca*.
- Leaflets oblong, entire margined, 3-toothed at the apex. 4. *P. comarioides*.
- Leaves softly velutinous on both sides. 5. *P. Haematochelus*.
- Leaves pinnate with approximate leaflets. 6. *P. Ehrenbergiana*.

§ 2. TORMENTILLAE.

Plants perennial with a more or less prostrate or spreading stem, often rooting at the nodes. Leaves digitately 3-5-foliolate. Flowers middle-sized, borne on long solitary axillary pedicels. Petals 4 or 5, obcordate, yellow, surpassing the sepals by about one half. Stamens 16-20, with rather short filaments. Pistils numerous ; style slender, filiform.

The original *Tormentilla* had 4-merous flowers, but sometimes, however, they are 5-merous, and other species that have regularly 5-merous flowers have no other character which would warrant the division into two groups, much less into two genera. The group is mainly European, only three species being natives of North America.

Leaflets not tomentose beneath.

Flowers 5-merous ; leaves usually all 5-foliolate.

Bractlets lanceolate, about equalling the sepals.

Stems long-assurgent ; first flower from the axil of the second stem leaf or some subsequent leaf.

7. *P. Canadensis*.

Plants low, less than 1 dm. high ; first flower from the axis of the first stem leaf.

8. *P. pumila*.

Bractlets ovate or elliptic, much exceeding the sepals.

9. *P. reptans*.

Flowers 4-merous ; upper leaves 3-foliolate.

10. *P. procumbens*.

Leaflets white-tomentose beneath ; flowers 5-merous.

11. *P. longipes*.

§ 3. HETEROSEPALAE.

Plant decumbent, in habit much resembling certain species of the following group, but evidently perennial ; the bractlets nearly always 3-cleft, which character has given name to the species and the group.

A single Mexican and Central American species.

12. *P. heterosepala*.

§ 4. SUPINAE.

Plants annual, biennial or short-lived perennial, leafy ; the leaves of the many-flowered cyme very little reduced, so that the flowers seem more or less axillary. Flowers small, petals scarcely exceeding the sepals, often only half as long, yellow or whitish, cuneate. Stamens often fewer than 20, with short filaments and small didymous anthers. Style short and thickened and glandular below, subterminal ; stigma minute.

To this group belong three or four European and Asiatic species and the following :

Achenes with a corky gibbosity on the upper suture.

Leaves all pinnate with 3-5 pairs of leaflets ; inflorescence cymose.

13. *P. paradoxa*.

Lower leaves pinnate with 2-3 pairs, the upper ternate ; inflorescence falsely racemose.

14. *P. Nicotletii*.

Achenes not gibbous.

Leaves pinnate with 2 approximate pairs of leaflets, the upper (seldom all) ternate ; stem strict ; inflorescence cymose.

15. *P. rivalis*.

Leaves all ternate (the lower rarely 5-foliolate).

Petals much shorter than the sepals ; achenes whitish.

Stem diffusely branched, spreading ; leaflets cuneate, inflorescence cymose.

Petals yellow ; stamens 10.

16. *P. leucocarpa*.

Petals white ; stamens 5 (Mexican).

17. *P. Michoacana*.

Stem strict, leaflets broadly obovate ; inflorescence falsely racemose.

18. *P. biennis*.

Petals about equalling the sepals ; stem strict.

19. *P. Monspelienensis*.

Lower leaves digitately 5-foliolate, or ternate with the lateral leaflets 2-cleft to near the base.

20. *P. pentandra*.

§ 5. ARGENTEAE.

Perennials, with leafy stems and more or less leafy many-flowered cymes. Flowers small. Petals slightly exceeding the sepals, yellow, obovate and slightly emarginate. Stamens 20, with rather short filaments. Pistils numerous; style short, rather stout, but neither thickened nor glandular at the base.

A group of European and Asiatic origin, but *P. argentea* common also in eastern North America.

Leaves green on both sides.

21. *P. intermedia*.

Leaves grayish silky and slightly tomentose beneath.

22. *P. inclinata*.

Leaves white-tomentose beneath.

Teeth of the leaves ovate, margin not revolute; fruiting calyx 5-7 mm. in diameter.

23. *P. collina*.

Teeth of the leaves oblong or linear, margin revolute; fruiting calyx 5 mm. in diameter or less.

24. *P. argentea*.

§ 6. CONCINNAE.

Plants perennial with a more or less thickened caudex; stems generally several, low, spreading or at last prostrate. Leaves digitately 5-7-foliolate, silky above, more or less tomentose beneath. Cymes few-flowered. Petals yellow, broadly obovate to cuneate, truncate or emarginate, a little exceeding the sepals. Style filiform but rather short.

A small group containing only four American species. It is nearest related to the *Nircae*, *Aurcae* and *Subviscosae* differing mainly from the first by the more numerous leaflets and from the last two by the tomentum. (*P. quinquefolia* with the terminal leaflets petiolate may be sought in this group.)

Leaves densely tomentose beneath.

Leaflets obovate or cuneate, deeply toothed or incised; sepals and bractlets ovate or oblong.

25. *P. concinna*.

Leaflets oblanceolate, with small upwardly directed teeth; sepals and bractlets narrowly lanceolate.

26. *P. oblanceolata*.

Leaflets oblong with entire margins, only 3-toothed (seldom 5-toothed) at the very apex.

27. *P. bicrenata*.

Leaves densely silvery-silky on both sides, only slightly tomentose beneath.

28. *P. concinnaeformis*.

§ 7. SUBVISCOSAE.

Perennials, with a deep thick root. Stems many, short, spreading with divergent branches. Leaves silky or hirsute, not at all tomentose. Petals yellow, obcordate, and often inclined to be slightly unguiculate, exceeding the calyx. Bractlets and sepals in-

curved in fruit and enclosing the comparatively few and large achenes. Style filiform and very slender.

A small group related to the *Aurcae*, *Concinnae* and *Graciles*.

Petals not unguiculate, plant silky-villous.

29. *P. Wheeleri*.

Petals unguiculate; plant hirsute and glandular puberulent.

Leaflets 1-4 cm. long.

30. *P. subviscosa*.

Leaflets 5-7 cm. long with prominent veins.

31. *P. ramulosa*.

§ 8. AUREAE.

Perennials with an ascending short scaly rootstock. Stem (in ours) rather simple, ascending or erect, few-flowered. Leaves digitately or pinnately 5- (seldom 7-) foliolate, in the latter case with approximate leaflets. Pubescence scant, silky-strigose, or hirsute, not at all tomentose (or rarely slightly so in *P. dissecta*). Petals yellow, obcordate, exceeding the sepals. Bractlets and sepals not incurved in fruit. Style filiform.

The plants much resemble the *Frigidae*, but have more leaflets. *P. dissecta* connects the group with the *Graciles*, which they resemble except as to the size of the plant, and *P. multisecta* connects it with the *Multijugae*. Most of the species belonging to this group have truly digitate leaves, but in the North American representatives the outer leaflets are often inserted lower down and the leaves become pinnate with approximate leaflets.

Leaflets almost linear, 3-toothed at the apex.

32. *P. Sierrae-Blancae*.

Leaflets obovate, merely crenate.

Leaves thick, short-petioled (Mexican).

33. *P. ranunculoides*.

Leaves thin, the basal ones with slender petioles (Arctic).

34. *P. maculata*.

Leaflets coarsely serrate with acute teeth.

35. *P. dissecta*.

Leaflets divided about $\frac{2}{3}$ to the midrib into oblong or lanceolate rather obtuse segments.

Leaves rather firm with prominent ribs.

36. *P. decurrens*.

Leaves thin; nerves not prominent.

37. *P. Ranunculus*.

Leaves divided to near the midrib into linear segments.

38. *P. multisecta*.

§ 9. GRACILES.

Tall perennials (except depauperate specimens), over 2 dm., generally over 3 dm. high, with open rather few-flowered cymes. Leaves digitately (in *P. pulcherrima* often pinnately) 5-9-foliate. Petals obcordate, exceeding the sepals by a third or more. Style in most long, slender and filiform (in *P. sulphurea* rather short and stout). Sta-

mens in most species 20 in three series, in *P. sulphurea* 30, in *P. staminea* 40. The pubescence and form of the leaflets is very variable.

The group differs from *Aurcae*, *Concinnae*, and *Subriscosae*, mainly in the size of the plants; from *Argentae* in the less leafy stem and larger flowers, and from *Haematochri* in the color of the petals.

This group is the most difficult in the whole genus. It contains so many and so perplexing forms, that I have not yet come to any satisfactory conclusion as to how to treat it. Watson united all species of the United States (except *P. pulcherrima* and *P. sulphurea*) into one species. This is far from satisfactory; it would have been much more logical to make *P. effusa* a variety of *P. Hippiana*, *P. Breweri* one of *P. Plattensis* or *P. emarginata* one of *P. fragiformis* than to include *P. Nuttallii* and *P. flabelliformis* in *P. gracilis*. The group contains not less than eleven well marked North American forms and about half a dozen less marked. Of these forms all except two have been recognized at one time or another as species or varieties, and as far as I know, all but one have received names. I shall temporarily regard these eleven as species.

This view I venture to express, as I have had opportunity to study the group especially in the field. I have collected the following: *P. pulcherrima*, *Blaschkeana*, *flabelliformis*, *ctenophora*, *fastigiata*, *ctomentosa* and *Nuttallii*. I have seen the following growing together: *pulcherrima* and *Nuttallii*, *Blaschkeana* and *Nuttallii*, *Blaschkeana* and *flabelliformis*, *Blaschkeana* and *ctenophora*, *flabelliformis* and *Nuttallii*. In no case have I found intermediate forms. In the herbaria that I have looked over I have found one specimen between *Blaschkeana* and *ctenophora*, and a few between *Nuttallii* and *Blaschkeana* or *fastigiata*, but as a rule they can be distinguished fairly well. (Taller forms of *P. dissecta* will be sought in this group.)

Leaflets merely crenate or serrate.

Leaves green on both sides.

Leaves thick and leathery; stem glandular above.

39. *P. subcoriacea*.

Leaves thin.

Leaflets crenate; petals little exceeding the sepals.

40. *P. ctomentosa*.

Leaflets coarsely serrate.

Basal leaves 7-foliolate; petals twice as long as the sepals.

41. *P. heptaphylla*.

Basal leaves 5-foliolate; petals not twice as long as the sepals.

[35. *P. dissecta*.]

Leaves grayish-silky and slightly tomentulose beneath; plant rather low.

42. *P. fastigiata*.

Leaves densely tomentose beneath.

Stem sparingly silky-strigose, slender.

43. *P. pulcherrima*.

Stem and petioles rather densely villous with spreading hairs (Mexican).

Stem 4-6 dm. high, leafy; basal leaves 7-foliolate.

44. *P. staminea*.

Stem less than 3 dm. high, 1-2-leaved; basal leaves 5-foliolate.

45. *P. leptopetala*.

- Leaves coarsely toothed or cleft about half-way to the midrib.
 Leaves white-silky on both sides ; plant low. 46. *P. candida*.
 Leaves greenish above, densely white-tomentose beneath.
 Stem slender ; leaflets oblanceolate, the teeth triangular. 47. *P. gracilis*.
 Stem stout ; leaflets obovate ; teeth ovate or oblong. 48. *P. Blaschkeana*.
 Leaves silky or somewhat tomentulose beneath.
 Segments linear ; leaves more or less silky. 53. *P. pectenisecta*.
 Segments oblong or triangular ; leaves green, slightly tomentulose beneath. 49. *P. viridescens*.
 Leaves green on both sides.
 Plant stout, more or less hirsute.
 Petals slightly exceeding the sepals, deep yellow.
 Stamens about 20 ; native. 50. *P. Nuttallii*.
 Stamens about 30 ; introduced. 51. *P. recta*.
 Petals exceeding the sepals by one-half, sulphur yellow. 52. *P. sulphurea*.
 Plant slender, slightly silky. [35. *P. dissecta*.]
 Leaflets divided to near the midrib.
 Leaves silky and somewhat tomentulose beneath. 53. *P. pectenisecta*.
 Leaves densely tomentose beneath.
 Margin revolute. 54. *P. flabelliformis*.
 Margin not revolute. 55. *P. stenophora*.

§ 10. SUBJUGAE.

This group, as well as the *Rubricaulæ*, form the connection between the *Graciles* on one hand and the *Niveæ* and the *Leucophyllæ* on the other. There is a combination of digitate and pinnate characters in the leaves. In *P. subjuga* the pinnate tendency is seen in the small leaflets on the petiole ; and in *P. quinquefolia* in the petiolate middle leaflet. The species are in size intermediate between *P. gracilis* or *P. pulcherrima* and *P. nivea* and much resemble depauperate forms of either of the two first or an over-developed *P. nivea*.

- Basal leaves digitately 5-foliolate with an additional small pair of leaflets on the petiole. 56. *P. subjuga*.
 Basal leaves digitately 5- (seldom 3-) foliolate with the middle leaflet petiolate. 57. *P. quinquefolia*.

§ 11. OVALES.

Low plants with the habit of a *Fragaria*, white flowers, 3-foliolate leaves and 3-toothed sepals.

- One Mexican species. 58. *P. ovalis*.

§ 12. FRIGIDAE.

Plants low with a scaly rootstock, often tufted. Leaves digitately 3-foliolate, not at all tomentose, in ours coarsely toothed. Petals yellow, obcordate. Style filiform, but sometimes short.

The group is very nearly related to *Aureae* and *Niveae*, differing from the former only in the number of the leaflets, and from the latter by the lack of tomentum. (*P. Grayi* has also 3-foliolate leaves, but the middle leaflet is petiolate, which indicates that the leaves are really pinnate; as the structure of the pistil is that of *P. brevifolia*, it is placed in the same group as that species.)

Leaflets all sessile, or short-petiolate.

Stem 1-3 dm. high, simple; bractlets oval or elliptic, generally obtuse.

Leaves smooth.

59. *P. flabellifolia*.

Leaves hairy.

Leaflets broadly obovate, 3-4-crenate at the apex, somewhat glandular. 60. *P. Friesiana*.

Leaflets broadly obovate, coarsely toothed, not glandular.

61. *P. fragiformis*.

Stem less than 1 dm. high.

Petals much exceeding the sepals.

Teeth of the leaves obtuse, the terminal one smallest.

62. *P. nana*.

Teeth of the leaves acute, the terminal one largest.

63. *P. emarginata*.

Petals scarcely exceeding the sepals.

64. *P. Robbinsiana*.

Terminal leaflet long-petiolate.

[89. *P. Grayi*.]

§ 13. BIFLORAE.

Plant caespitose, the stems subscapose, 1-3-flowered. Leaves ternate with the leaflets divided to near the base into 2 or 3 linear entire, somewhat revolute segments, not tomentose. Petals broadly elliptic, yellow, slightly emarginate. Style long and filiform. Receptacle beset with long hairs.

The group contains only one species, which shows very little relationship to the others.

Species.

65. *P. biflora*.

§ 14. NIVEAE.

Plants mostly low and tufted. Rootstock often thick, scaly. Leaves digitately 3-foliolate, more or less tomentose beneath. Petals obcordate, yellow. Style short, often inclined to be thickened and glandular at the base.

The relationship of the group is with *Concinnae*, *Multifidae*, and *Frigidae*. (Trifoliate specimens of *P. quinquefolia* may be sought here.)

- Stem 3-5 dm. high, many-flowered ; leaflets lanceolate (Mexican). 66. *P. Pringlei*.
 Stem 1-2 dm. high, more or less leafy, several-flowered.
 Flowers 8-15 mm. in diameter ; stem slender.
 Leaves deeply dissected ; sepals lanceolate. 67. *P. Hookeriana*.
 Leaves coarsely dentate ; sepals ovate-lanceolate. 68. *P. nivea*.
 Leaves dissected half way to the midrib. [57. *P. quinquefolia*.]
 Flowers 20-30 mm. in diameter ; stem stout. 69. *P. villosa*.
 Stem less than 1 dm. high, subscapose, 1-3-flowered.
 Plant not yellowish hairy ; bractlets oblong or lanceolate. 70. *P. uniflora*.
 Plant covered with yellowish villous hairs ; bractlets broadly ovate or elliptical. 71. *P. Vahliaana*.

§ 15. MULTIFIDAE.

Mostly decumbent or ascending perennials (*P. Pennsylvanica* and *P. bipinnatifida* however erect). Leaves pinnate, of 2-7 pairs of incised or dissected leaflets, more or less tomentose beneath. Petals yellow, obovate, slightly if at all emarginate, generally not exceeding the sepals. Style very short, in all our species except *P. multifida*, thickened and glandular at the base.

The larger species resemble somewhat the *Leucophyllae*, and the smaller ones, the *Rubricaules*, but differ from both groups by the short and thick style. Through *P. pulchella* and *P. pseudosericea* the group connects with the *Niveae*.

Pubescence not silvery-white.

- Stem decumbent or ascending ; leaflets 2-3 rather approximate pairs.
 Terminal leaflet stalked ; plant 5 cm. high or less. 72. *P. Sommerfeltii*.
 Terminal leaflet sessile.
 Stem silky-villous with yellowish hairs. 73. *P. pulchella*.
 Stem slightly silky-strigose.
 Segments of the leaves obtuse ; style thickened at the base. 74. *P. litoralis*.
 Segments of the leaves acute ; style not thickened. 75. *P. multifida*.
 Stem erect ; leaflets 3-7, usually rather remote pairs.
 Stem glabrate, or merely puberulent. 76. *P. glabrella*.
 Stem more or less hirsute.
 Plant dark green ; leaves scarcely paler beneath. 77. *P. atrovirens*.
 Plant not dark green, leaves decidedly paler beneath. 78. *P. Pennsylvanica*.
 Pubescence silvery-white on one or both sides of the leaves.
 Stem decumbent or ascending, $\frac{1}{2}$ -1 dm. high. 79. *P. pseudosericea*.
 Stem erect, 3-5 dm. high. 80. *P. bipinnatifida*.

§ 16. RUBRICAULES.

Plants more or less caespitose, with ascending or decumbent (rarely erect), short, few-leaved or subscapose stems. Leaves pinnate with 2 (seldom 3) pairs of approximate leaflets, more or less tomentose beneath. Petals yellow, obcordate. Style long and slender, filiform.

In general habit the group much resembles the smaller members of *Multifidae*, but differs by the long slender styles. It connects through the first species with *Leucophyllae*, through the third with *Subjugae* and through the last one with *Multijugae* and *Niveae*. (*P. concinna divisa* may be sought here.)

Leaves densely silky on both sides.

Pubescence white; stem erect or ascending.

Leaves with 2 or 3 pairs of leaflets; bractlets much shorter than the sepals.

81. *P. filicaulis*.

Leaves with 3-5 pairs of leaflets; bractlets little if any shorter than the sepals.

82. *P. Macounii*.

Pubescence yellowish; stem decumbent.

83. *P. lutesericca*.

Leaves mostly greenish above.

Sepals lanceolate or linear.

Stem ascending or prostrate; segments of the leaves narrowly oblong.

84. *P. rubricaulis*.

Stem ascending, slender; segments of the leaves oval to orbicular.

85. *P. minutifolia*.

Stem nearly erect, slender; segments of the leaves linear.

86. *P. tenerrima*.

Sepals broadly ovate-triangular.

Plant densely caespitose.

87. *P. saximontana*.

Plant with spreading branches.

[24. *P. concinna divisa*.]

§ 17. BREVIFOLIAE.

Low alpine plants with a perennial short rootstock and few-leaved erect or ascending stems, seldom much over 1 dm. high. Leaflets pinnate with 1-2 pairs of leaflets, nearly glabrous. Petals obcordate, yellow, exceeding the sepals. Apex of the achene slightly incurved, with the long slender filiform style inserted below the tip.

The group consists of two species, of which the first is somewhat related to the *Multijugae*, while the second is near *P. glabellifolia* of the *Frigidae*.

Leaves pinnate with 2 pairs of leaflets.

88. *P. brevifolia*.

Leaves pinnately 3-foliolate.

89. *P. Grayi*.

§ 18. MULTIJUGAE.

Perennials with a very short rootstock and a deep root. Stem erect, ascending or prostrate, generally less than 3 dm. high. Leaves sparingly hirsute or strigose, not to-

mentose, pinnate, with 3–13 pairs (in *P. Drummondii* sometimes only 1 or 2 pairs) of coarsely toothed or dissected leaflets. Petals yellow or white, obcordate. Style long and slender, generally filiform.

The relationship of the group is with the *Aurcae*, *Leucophyllae* and *Brevifoliae*.

Leaves dissected to near the midrib.

Leaf-segments narrowly linear ; fruiting calyx abruptly reflexed. 90. *P. millefolia*.

Leaf-segments oblong to linear ; fruiting calyx not abruptly reflexed.

Stem less than 1 dm. high, erect, with 1–3 small leaves.

Leaflets with 7–9 divergent segments. 91. *P. Arizonica*.

Leaflets with 3–5 (seldom 7) ascending segments. 92. *P. pinnatisecta*.

Stem leafy, over 1 dm. high, decumbent or ascending. 93. *P. Plattensis*.

Leaves not dissected to near the midrib.

Leaflets 2–8 pairs.

Stem decumbent, seldom ascending, leafy. 93. *P. Plattensis*.

Stem erect or ascending, few-leaved.

Stem villous with spreading hairs. 94. *P. Richardii*.

Stem not villous with spreading hairs.

Leaflets less than 2 cm. long ; calyx silky-strigose. 95. *P. Cascadensis*.

Leaflets over 2 cm. long ; calyx hirsute. 96. *P. Drummondii*.

Leaflets 8–13 pairs. 97. *P. multijuga*.

§ 19. ARENICOLAE.

Plant originally described as an annual but root evidently perennial or at least biennial. There is, however, no rootstock or woody caudex as in the species of the preceding group. The flowers are white and the receptacle is beset with bristles that exceed the ovaries in length ; the style is long and slender, a little thickened and glandular near the base. The species composing to the group was first described as an *Ivesia*, but the numerous pistils, form of the petals and especially the position of the stamens makes it a typical *Potentilla*. The form of the leaves is that of the preceding group.

A single species.

98. *P. Newberryi*.

§ 20. LEUCOPHYLLAE.

Rather stout perennials. Leaves pinnate, with 3–6 pairs of leaflets, grayish or whitish hairy, generally densely silky, villous or tomentose especially beneath, coarsely toothed or incised, but not dissected. Petals obcordate, longer than the sepals. Pistils sometimes few ; style filiform.

The relationship is with the *Multijugae* and *Multifidae*.

Leaves white-tomentose, especially beneath.

Leaves silky as well as tomentose ; bractlets nearly equalling the acute sepals ;
branches erect.

99. *P. Hippiana*.

Leaves tomentose on both sides ; bractlets shorter than the acuminate sepals ;
branches spreading.

Stem ascending, not very slender.

100. *P. effusa*.

Stem erect, very slender ; pistils few.

101. *P. Coloradensis*.

Leaves more or less white-wooly on both sides.

102. *P. Breweri*.

Leaves grayish silky.

Stem stout, erect, 6-7 dm. high ; leaflets obovate, oblong, coarsely serrate. 103. *P. ambigens*.

Stem 1-4 dm. high, leaflets cuneate or linear-oblong, toothed at the apex only.

Stem ascending or decumbent ; leaves conduplicate ; pistils numerous. 104. *P. crinita*.

Stem erect ; leaves flat ; pistils 5-12.

105. *P. Lemmoni*.

§ 21. CANDICANTES.

Consists of only one Mexican species, in many respects resembling the *Multijugae*, but with densely silvery-white pubescence.

A single species.

106. *P. candicans*.

§ 1. HAEMATOCHEIL.

1. *Potentilla Thurberi* Gray.

Potentilla Thurberi Gray, Mem. Am. Acad. (II) 5 : 318. 1854.

Lehm. Ind. Sem. Hort. Hamb. 1854 : 10 ; Otto's Gartenz. 10 : 459, Rev. Pot. 92 ; Torr. Bot. Mex. Bound. Surv. 64 ; Wats. Proc. Am. Acad. 8 : 561 ; Rothrock, in U. S. Geog. Surv. 4 : 113 (partly) ; Rydberg, Bull. Torr. Bot. Club, 24 : 11.

ILLUSTRATIONS : PLATE 2, f. 1 ; staminiferous disk, f. 2 ; pistil, f. 3 ; stamens, f. 4 and 5 ; fruiting hypanthium and calyx, f. 6.

Stem ascending, 3-7 dm. high, finely pubescent and sometimes somewhat villous. Stipules large, 1-2 cm. long, broadly ovate, coarsely toothed. Basal and lower stem leaves long-petioled, digitately 5-7-foliolate, glabrate or slightly silky, thin, sometimes slightly paler beneath but not tomentose. Leaflets obovate, 3-5 cm. long, coarsely toothed with broad teeth, almost crenate. Upper stem leaves sessile, 3-5-foliolate with oblong leaflets ; cyme open and branched. Flowers about 15 mm. in diameter. Hypanthium puberulent, in fruit about 1 cm. in diameter. Bractlets lanceolate, about equalling the triangular acute sepals. Petals nearly orbicular, emarginate, exceeding the sepals, dark reddish purple. Stamens 20, the inner 5 with thicker filaments and borne on a ring-like thickening of the disk. Pistils numerous.

P. Thurberi differs from the other purple-flowered American species by its green, often glabrate and thinner leaves, the teeth of which are much broader and rounder than in *P. atrorubens* and much deeper than in *P. Hacmatochrus*. It seems to be a comparatively rare plant, growing in New Mexico, California and Arizona and probably in northern Mexico.

New Mexico: Thurber, No. 1107, 1851; Dr. Henry, 1854; Dr. Bigelow (Mex. Bound. Surv.), No. 347, 1851; E. L. Greene, 1880; E. Palmer, 1869; F. H. Snow, No. 2290, 1884.

Arizona: J. T. Rothrock, No. 310, 1874; Lemmon, 1881; C. G. Pringle, 1884; E. A. Mearns, 1885 (depauperate); Wooton, 1895; J. W. Toumey, 1896; Dr. Kunze, 1896.

California: Parry, No. 22.

2. *Potentilla atrorubens* Rydberg.

Potentilla atrorubens Rydberg, Bull. Torr. Bot. Club, **24**: 11. 1897.

Potentilla Thurberi Rothrock, Wheeler Surv. **4**: 113, mainly. 1878. Britton, Trans. N. Y. Acad. Sci. **8**: 66.

ILLUSTRATIONS: Bull. Torr. Bot. Club, **24**: *pl.* 288. PLATE 3, *f.* 1 and 2; dissection of flower, *f.* 3; stamens, *f.* 4; pistil, *f.* 5; fruiting hypanthium and calyx, *f.* 6.

Stem 4–7 dm. high, finely pubescent and with scattered long villous spreading or reflexed hairs. Stipules ovate or lanceolate, 1–2 cm. long, often toothed. Basal and lower stem leaves long-petioled, digitately 5–7-foliolate, glabrous or slightly silky above, silky and white-tomentose beneath; leaflets obovate to oblanceolate, coarsely serrate; stem leaves sessile, 3–5-foliolate. Cyme open and branched; flowers about 15 mm. in diameter; hypanthium silky-villous and finely pubescent, about 1 cm. in diameter. Bractlets lanceolate, often equalling the lanceolate-triangular, more or less acuminate sepals. Petals dark reddish purple, very broadly obcordate, exceeding the sepals. Stamens 20.

This species much resembles *P. Thurberi*, from which I have recently distinguished it. It differs in several characters that seem to be fairly constant, viz., the tomentum on the lower surface of the leaves, the much sharper dentation, the long silky spreading or reflexed hairs of the stem and hypanthium, and generally more acuminate sepals. From the Mexican *P. fusca* and *P. comarioides* it differs in the leaflets, which are serrate to the very base. It seems to be more common than *P. Thurberi* and has about the same range.

Arizona: Rothrock, No. 399, 1874; C. G. Pringle, No. 305, 1881; 1884; No. 1578, 1887; M. E. Jones, 1884; J. G. Lemmon, No. 2699, 1882; 1892; E. A. Mearns, No. 50, 1887; T. E. Wilcox, 1893; G. C. Neally, No. 109, 1891.

New Mexico: H. H. Rusby, No. 128, 1881.

Mexico: E. Palmer, No. 426, 1885; C. G. Pringle, No. 1578, 1887.

3. *Potentilla fusca* Schlecht.

Potentilla fusca Schlecht. *Linnaea*, **13**: 262. 1839; Walp. Rep. **2**: 28; Diet. Syn. Pl. **3**: 185.

Potentilla comarioides fusca Lehm. Rev. Pot. 111. 1856. Walp. Ann. **2**: 489. 1852.

Potentilla Haematochrus Hemsley, Biol. Cent. Am. **1**: 376 (in part). 1880.

Stem from a thick ligneous root, ascending, grayish-silky; basal leaves petioled, digitately 7-foliate, green above, white-tomentose beneath; leaflets oblong, attenuate at the base, obtuse, crenate from the middle to the apex. Stem leaves sessile, the upper ternate. Petals dark red, longer than the lanceolate acuminate sepals.

It grows in mountain meadows of Central Mexico: *Schiede, *Ehrenberg.

4. *Potentilla comarioides* Humb. & Bonpl.

Potentilla comarioides Humb. & Bonpl.; Nestler, Mon. Pot. 28 and 62. 1876.

Schlecht. *Linnaea*, **13**: 262; Kunth, Nov. Gen. & Spec. Pl. **4**: 217; Seringe in DC. Prod. **2**: 584; Sprengel, Syst. Veg. **2**: 539; Lehm. Mon. Pot. 26 137; Don, Gard. Diet. **2**: 556; Dietr. Syn. Pl. **3**: 185; Walp. Ann. **2**: 489; Poir. Suppl. **4**: 542; Hemsley, Biol. Cent. Am. **1**: 376.

Potentilla rubra Willd.; Schlecht. Mag. Ges. Nat. Fr. Berlin, **7**: 292.*

ILLUSTRATIONS: Nestl. Monogr. pl. 4. f. 2.

Stems ascending from a thick root, few-flowered and few-leaved, silky-canescens; basal leaves quinate, appressed-pilose or glabrate above, silvery white beneath; leaflets narrowly oblong, 3-5-toothed at the apex; stem leaves ternate; bractlets oblong, acutish, shorter than the ovate acute sepals. Petals broadly obovate, twice as long as the sepals, dark purple.

In the mountains of Central and Southern Mexico: *Humboldt and Bonpland; *Keerl; *Schiede; *Ehrenberg.

5. *Potentilla Haematochrus* Lehm.

Potentilla Haematochrus Lehm. Ind. Sem. Hort. Bot. Hamb. **1836**: 7. 1836.

Lehm. *Linnaea*, **12**: Lit. 38; Knowles & Weste. Fl. Cab. & Mag. Ex. Bot. **3**: 115*; Schlecht. *Linnaea*, **13**: 263; Lehm. Rev. Pot. 110; Hemsley, Biol. Cent. Am. **1**: 376; Dietr. Syn. Pl. **3**: 185; Walp. Rep. **2**: 31.

Potentilla Haematochroa Walp. Ann. **2**: 489, 1852.

ILLUSTRATIONS: Knowles & Weste. Fl. Cab. **3**: pl. 119; Lehm. Rev. Pot. pl. 39.

Stem from a thick ligneous root, ascending, yellowish, subvelutinous and with longer, spreading or reflexed hairs; basal leaves digitately 7-foliate, petioled, yellowish, subvelutinous on both sides; leaflets obovate-oblanccolate or broadly oblong, crenate along the whole margin, and with prominent veins

*The asterisk indicates that I have either not seen the specimen cited, or have not verified the citation.

below ; bractlets lanceolate, nearly equalling the ovate-acuminate sepals. Petals obcordate, dark red, longer than the sepals.

In the mountains of Central and Southern Mexico.

Mexico: G. Schiede (Vallis Tolucensis); C. G. Pringle, No. 3615, 1890 ; * Ehrenberg.

6. *Potentilla Ehrenbergiana* Schlecht.

Potentilla Ehrenbergiana Schlecht. *Linnaea*, **13**: 261 ; *Lehm. Rev. Pot.* 74 ; Hemsley, *Biol. Cent. Am.* **1**: 376 ; *Dietr. Syn. Pl.* **3**: 189 ; *Walp. Rep.* **2**: 31 ; *Ann.* **2**: 483.

ILLUSTRATION: *Lehm. Rev. Pot. pl.* 32.

Stem from a thick ligneous root, ascending, canescent ; basal leaves petioled, pinnate with 2 or 3 approximate pairs of leaflets, green and appressed-pilose above, dirty white-tomentose beneath ; leaflets oblong, coarsely incised ; stem leaves few, the upper ternate or simple ; bractlets and sepals lanceolate, the former a little smaller. Petals obcordate, slightly longer than the sepals.

Central Mexico: * Ehrenberg.

§ 2. TORMENTILLAE.

7. *Potentilla Canadensis* L.

Potentilla Canadensis L. *Sp. Pl.* 498. 1753.

L. Sp. Pl., Ed. 2: 713 ; *Poir. in Lam. Enc. Meth.* **5**: 595 ; *Willd. Sp. Pl.* **2**: 1106 ; *Persoon, Syn. Pl.* **2**: 55 ; *Nestler, Mon. Pot.* 27 & 58 ; *Lehm. Mon. Pot.* 25 & 118 ; *Spengel, Syst. Veg.* **2**: 538 ; *Seringe, in DC. Prod.* **2**: 575 ; *Don, Gard. Diet.* **2**: 552 ; *Dietr. Syn. Pl.* **3**: 180 ; *Walp. Rep.* **2**: 34 ; *Ann.* **2**: 513 ; *Lehm. Rev. Pot.* 187.

Walt. Fl. Car. 150 ; *Michx. Fl. Bor. Am.* **1**: 303 ; *Pursh, Fl. Am. Sept.* 354 ; *Ell. Sk. Bot. S. C. & Ga.* **1**: 574 ; *Nutt. Gen. N. A. Pl.* **1**: 310 ; *Eat. Man. Ed.* 2: 378 ; *Ed.* 3: 407 ; *Ed.* 5: 343 ; *Ed.* 6: 280 ; *Ed.* 7: 457 ; *Barton, Comp. Fl. Phil.* 236 ; *Torr. Fl. U. S.* 496 ; *Comp.* 210 ; *Darl. Florula Cest.* 65 ; *Flora Cest.* 303 ; *Ed.* 3: 78 ; *Beck, Bot.* 106 ; *Ed.* 2: 99 ; *Torr. & Gray, Fl. N. Am.* **1**: 443 ; *Eat. & Wr. N. Am. Bot.* 373 ; *Torr. Fl. N. Y.* 208 ; *Gray, Man. Ed.* **1**: 122 ; *Ed.* 2: 118 ; *Ed.* 5: 154 ; *Noll, Fl. Pa.* 433 ; *Gray, Pac. R. R. Rep.* **12**: book 2, part 2: 39 ; *Chapman, Fl. So. States*, 124 ; *Darby, Bot. So. States*, 303 ; *Wood, Class Book*, 342 ; *Bot. & Flor.* 107 ; *Wats. Proc. Am. Acad.* **8**: 562 ; *Holz. Cont. U. S. Nat. Herb.* **1**: 205 ; *Wats. & Coult. in Gray, Man. Ed.* 6: 160 ; *Bailey, in Gray, F. F. & G. Bot. Rev. Ed.* 152 ; *Rydb. Bull. Torr. Bot. Club*, **24**: 10 ; *Britt. & Brown, Ill. Fl.* **2**: 216.

Lehm. in Hook. Fl. Bor. Am. **1**: 192 ; *Provancher, Fl. Can.* 188 ; *Macoun, Cat. Can. Pl.* 141.

Fragaria Canadensis Crantz, *Inst.* **2**: 178.

ILLUSTRATIONS: *Nestler, Mon. Pot. pl.* 10. *f.* 1 ; *Britt. and Brown, Ill. Fl.* **2**: *f.* 1935.

Root perennial, branched. Stems few, slender, silky-villous, generally with spread-

ing pubescence tinged with red, at first upright or adsurgent, later decumbent or prostrate and flagelliform, 4–6 dm. long. Stipules ovate or lanceolate, often 2–5-cleft or toothed, with acute divisions. Basal leaves with slender petioles 4–6 cm. long, silky-stigose, digitately 5-foliolate or 3-foliolate with the lateral leaflets divided in two. Leaflets 2–4 cm. long, obovate or cuneate-oblong, coarsely and generally doubly serrate. Stem leaves similar but short-petioled and often somewhat fascicled. Flowers solitary from the axil of the second or some subsequent leaves, on slender pedicels 3–10 cm. long, 10–12 mm. in diameter. Hypanthium silky, in fruit about 8 mm. in diameter. Bractlets lanceolate, about equalling the ovate or lanceolate sepals. Petals yellow, obcordate, exceeding the sepals by about one-third.

Common from Maine and North Carolina to Indian Territory and Minnesota. I have seen one specimen collected in Nevada by W. H. Shockley, but this was undoubtedly introduced.

***Potentilla Canadensis simplex* (Michx.) T. & G.**

Potentilla simplex Michx. Fl. Bor. Am. **1** : 303. 1803.

Poir. in Lam. Enc. Meth. **5** : 596 ; Persoon, Syn. Pl. **2** : 55 ; Nestler, Mon. Pot. 25 & 40 ; Lehm. Mon. Pot. 27 & 142 ; Sprengel, Syst. Veg. **2** : 538 ; Tratt. Ros. Mon. 4* ; Seringe in DC. Prod. **2** : 575 ; Don, Gard. Dict. **2** : 552.

Pursh, Fl. Am. Sept. 354 ; Ell. Sk. Bot. S. C. & Ga. **1** : 574 ; Nutt. Gen. N. Am. Pl. **1** : 310 ; Eat. Man. Ed. 2 : 379 ; Ed. 3 : 407 ; Ed. 5 : 344 ; Ed. 6 : 280 ; Ed. 7 : 457 ; Bigel. Fl. Bost. 124 ; Ed. 2 : 204 ; Pl. Bost. 217 ; Bart. Comp. Fl. Phil. **1** : 236 ; Torr. Fl. U. S. 497 ; Comp. 210 ; Beck, Bot. 106 ; Darl. Florula Cest. 65 ; Fl. Cest. 304 ; Eat. & Wr. N. Am. Bot. 373.

Lehm. in Hook. Fl. Bor. Am. **1** : 192.

Potentilla Canadensis simplex Torr. & Gr. Fl. N. Am. **1** : 443. 1840.

Walp. Rep. **2** : 34 ; Ann. **2** : 513 ; Lehm. Stirp. Pug. **9** : 72 ; Lehm. Rev. Pot. 187. Gray, Man. Ed. 2 : 118 ; Ed. 5 : 154 ; Wood, Class Book, 343 ; Wats. Proc. Am. Acad. **8** : 563 ; Rydb. Fl. Neb. 21 : 18 ; Macoun, Cat. Can. Pl. 141 and 518.

Potentilla Caroliniana Poir. in Lam. Enc. Meth. **5** : 595 ; Persoon, Syn. Pl. **2** : 55.

Potentilla sarmentosa Muhl. ; Willd. En. Hort. Ber. 554 ; Bigel. Fl. Bost. Ed. 2 : 204 ; Eat. Man. Ed. 5 : 344 ; Ed. 6 : 280 ; Ed. 7 : 457 ; Bigel. Pl. Bost. 217 ; Eat. and Wr. N. A. Bot. 373.

ILLUSTRATIONS : Nestler, Mon. Pot. *pl. 9. f. 2*. PLATE 4. *f. 1* ; dissection of flower, *f. 2* ; pistil, *f. 3* ; stamen, *f. 4* ; fruiting hypanthium and calyx, *f. 5*.

Stems much elongated, 5-10 dm. long, with more appressed pubescence; leaves larger, with leaflets often 5-6 cm. long, more glabrate and green.

Well developed forms of this variety are very unlike the typical *P. Canadensis*, and Mr. Bicknell and Mr. Nash believe that it may be a good species. I have been unable, however, to observe any definite character by which to separate the two. As there seem to be several intermediate forms, I leave it at present as a variety; when the plant is better studied in the field it may be possible to separate from *P. Canadensis* not only *P. simplex* but perhaps one or two other species.

The variety has about the same range as the species, but seems to be more common, especially westward.

8. *Potentilla pumila* Poir.

Potentilla pumila Poir. in Lam. Enc. Meth. 5: 594, 1804; Nutt. Gen. N. A. Pl. 1: 310; Persoon, Syn. Pl. 2: 55; Sprengel, Syst. Veg. 2: 537; Eat. Man. Ed. 2: 379.

Potentilla Canadensis pumila Torr. & Gray, Fl. N. Am. 1: 443. 1840.

Lehm. Rev. Pot. 187; Gray, Man. Ed. 1: 122; Ed. 2: 118; Wood, Class Book, 343; Walp. Ann. 2: 513; Rydb. Bull. Torr. Bot. Club, 24: 10.

ILLUSTRATION: Britton & Brown, Ill. Fl. 3: f. 1935a. PLATE 18, f. 1; dissection of flower, f. 2.

Perennial, low, less than 1 dm. high. Stems at flowering time very short and upright; later on producing longer runner-like and prostrate branches, densely silky-strigose. Stipules small, lanceolate, entire or toothed. Basal leaves with silky-strigose petioles 2-4 cm. long, densely silky strigose, digitately 5-foliate; leaflets obovate, about 2 cm. long, coarsely serrate. Flowers few, axillary, the first one generally from the axil of the first stem leaf with a slender strigose pedicel 3-5 cm. long, 6-10 mm. in diameter. Hypanthium densely silky-strigose; bractlets and sepals subequal, narrowly lanceolate. Petals yellow, obcordate, a little exceeding the sepals. Stamens about 20. Styles slender, filiform.

This is nearly related to *P. Canadensis*, but Messrs. Bicknell and Nash, who have studied the plant in life are fully persuaded that it is distinct. Specimens of *P. Canadensis* and *P. pumila* are planted side by side in the New York Botanical Garden and retain their characters perfectly. It is therefore best to regard *P. pumila* as a distinct species, especially as it is confined to the Atlantic States, while *P. Canadensis* is also common in the Mississippi Valley. A few of the specimens studied are the following:

New York: Elizabeth G. Knight, 1877; Torrey; N. L. Britton, 1891.

Pennsylvania: J. K. Small, 1889, 1890.

9. *Potentilla reptans* L.

Potentilla reptans L. Sp. Pl. 499, 1753; Ed. 2: 714, 1762; Dieterich, Pflanz. Ed. 2: 92; Ait. Hort. Kew. 2: 216; Poir. in Lam. Enc. Meth. 5: 595; Ait. Hort. Kew. Ed. 2, 3: 278; Nestler, Mon. Pot. 28 and 66; Haller, Syn. Pot. 54; Lehm. Mon. 27 and 144; DC. Prod. 2: 574; Sprengel, Syst. Veg. 2: 538; Ledeb. Fl. Ross. 2: 52; Lehm. Rev. Pot. 183; Lange, Consp. Fl. Groenl. 6; Don, Gard. Diet. 2: 552; Dietr. Syn. Pl. 3: 180.

Rydb. Bull. Torr. Bot. Club, 24: 10.

Fragaria reptans Crantz, Inst. 2: 179.

ILLUSTRATIONS: Dietr. Fl. Boruss. 3: pl. 171*; Hayne, Artzn. 4: pl. 32*; Sturm, Deutsch. Fl. 91: pl. 12*; Eng. Bot. 12: pl. 862; Fl. Dan. 7: pl. 1164.

Stems from a perennial root, slender, prostrate, slightly strigose or glabrate, often rooting at the nodes. Stipules oblong-lanceolate, mostly entire. Leaves digitately 5-foliolate; leaflets 1-3 cm. long, cuneate, crenate or dentate. Bractlets ovate or elliptic, much exceeding the ovate sepals. Otherwise as in *P. Canadensis*.

This European species has been collected by Martindale in 1876 on ballast in New Jersey. It differs from *P. Canadensis* in the creeping and rooting stem, smaller leaves and large ovate or elliptic bractlets, which exceed the sepals.

10. *Potentilla procumbens* Sibth.

Tormentilla reptans L. Sp. Pl. 500. 1753. Not *P. reptans* L.

L. Sp. Pl. Ed. 2: 716; Willd. Sp. Pl. 2: 1112; Pers. Syn. Pl. 2: 56; Ait. Hort. Kew. Ed. 2, 3: 279; Wallr. Linnaea, 14: 579.

Potentilla procumbens Sibth. Fl. Oxon. 162. 1794.

Lehm. Rev. Pot. 179; Walp. Ann. 2: 512.

Potentilla sylvestris Renault, Fl. Dep. l'Orne, 148. 1804.*

Potentilla nemoralis Nestler, Mon. Pot. 28 and 65. 1816.

Lehm. Mon. 27 and 147; Ledeb. Fl. Ross. 2: 51; Sprengel, Syst. Veg. 2: 539; Walpers, Rep. 2: 34; Torr. & Gray, Fl. N. Am. 1: 444; Macoun, Cat. Can. Pl. 142; Wats. Proc. Am. Acad. 8: 563; Britton & Brown, Ill. Fl. 2: 216; Rydb. Bull. Torr. Bot. Club, 24: 10.

Potentilla tormentilloides Meyer; Tauch. Flora, 2: 467. 1819.*

Potentilla Neumyeriana Tratt. Ros. Mon. 4: 75. 1823.* Ser. in DC. Prod. 2: 574.

Potentilla Tormentilla nemoralis Seringe, in DC. Prod. 2: 574. 1825.

Potentilla Tormentilla procumbens Wend. Fl. Hass. 159. 1846.*

Potentilla erecta nemoralis Hampe, Fl. Herc. No. 665, fide Wallr. Linnaea, 14: 115.

Potentilla reptans Willd.; Led. Fl. Ross. 2: 52.

ILLUSTRATIONS: Lehm. Mon. pl. 13; Dietr. Fl. Boruss. 3: pl. 172*; Fl. Dan. 11: pl. 1819*; Sturm. Deutschl. Fl. 92: pl. 2*; Eng. Bot. 12: pl. 864; Britton & Brown, Ill. Fl. 2: f. 1936.

Stems several from a perennial root, prostrate and flagelliform, often rooting at the nodes, glabrate, or sparingly strigose. Stipules narrowly lanceolate and mostly entire. Basal leaves digitately 5- (sometimes 3-) foliolate, the upper 3-foliolate, slightly appressed-hairy or glabrate. Bractlets, sepals

and petals generally only 4 ; bractlets and sepals lanceolate, subequal ; petals obcordate. Otherwise as in *P. Canadensis*.

A native of Europe, which has been collected in Labrador.

Labrador: Collector not given. (The specimen was sent to Dr. Gray by Hooker.)

II. *Potentilla longipedunculata*.

Perennial by a creeping rootstock. Stems 4–5 dm. high, ascending, villous with long silky white hairs, rather weak and dichotomously branched, with solitary long-pedicelled flowers in the axils of the branches. Stipules rather large, about 2 cm. long, oblong-lanceolate ; leaves digitately 3–5-foliolate, slightly silky and green above, densely white-tomentose beneath, with slender petioles 4–6 cm. long ; leaflets oblanceolate, 3–5 cm. long, dissected halfway to the mid-rib into oblong lanceolate divergent segments. Pedicels solitary in the axils of the branches, almost 1 dm. long, slender, silky-villous with spreading long hairs. Flowers 2 cm. in diameter ; sepals and bractlets subequal, oblong-lanceolate, almost equalling the broadly cuneate yellow petals ; stamens about 20 ; pistils very few ; receptacle unusually hairy, style filiform but not very slender.

The form and the pubescence of the leaflets are almost identical with those of *P. gracilis*. It may be a form of that plant produced in a rich, shaded situation and was so regarded at first by me, but as the likeness is limited to the pubescence and the form of the leaves, I have come to the conclusion that it is better to describe it as a distinct species. The most important characters by which it is distinguished from *P. gracilis* are: the slender ascending stem, which is dichotomously branched, with a long-pedicelled flower in the axils ; the longer and sub-equal bractlets and sepals ; the cuneate, scarcely at all emarginate petals ; the long spreading hairs of the stem, petioles and pedicels, and the small number of pistils.

The type was collected by Susie Howell at Monmoth, Oregon, in 1893. It is preserved in the herbarium of the Experiment Station at Pullman, Washington.

§ 3. HETEROSEPALAE.

12. *Potentilla heterosepala* Fritsch.

Potentilla heterosepala Fritsch, Bot. Jahrb. **11** : 314. 1890 ; J. D. Smith, Bot. Gaz. **18** : 2.

Potentilla Donnell-Smithii Focke, Bot. Gaz. **16** : 3. 1891.

Perennial ; stems several, 4–5 dm., leafy, slender, decumbent, strigose and slightly glandular. Basal leaves numerous, pinnate, of 1–2 pairs of cuneate-obovate or broadly obovate, subincised-crenate leaflets, pilose on both sides, the terminal slightly stalked ; stem leaves ternate. Inflorescence leafy ; hypanthium hirsute ; bractlets 3-cleft, seldom entire, oblong-elliptic, obtuse ; sepals triangular, acute ; petals cuneate-obovate, emarginate, half longer than the sepals or more ; flowers 1 cm. in diameter.

It much resembles species of the following group in general habit, but is a true perennial. Central America and Mexico.

Guatemala: J. D. Smith, No. 2144, 1890; *Scherzer.

***Potentilla heterosepala Mexicana* Fritsch.**

Potentilla heterosepala Mexicana Fritsch, Bot. Jahrb. **11**: 315. 1890.

Smaller; stems 3–15 cm. long; leaves smaller, mostly ternate; inflorescence more simple; flowers about 7 mm. in diameter.

Mexico: *Wawra, No. 913 and 936; H. E. Seaton, No. 229. 1891.

§ 4. SUPINAE.

13. *Potentilla paradoxa* Nutt.

Potentilla paradoxa Nutt.; Torr. & Gray, Fl. N. Am. **1**: 437. 1840.

Lehm. Stirp. Pug. **9**: 74; Rev. Pot. 194; Walp. Rep. **2**: 32; Ann. **2**: 515.

Gray, Pl. Wright. **1**: 68; **2**: 55; Man. Ed. 2: 118; Ed. 5: 154; Pac. R. R. Rep. **12**: book 2, part 2: 39; Torr. Mex. Bound. Surv. 64; Wood, Class Book, 343; Bot. & Flor. 107; Britton, Bull. Torr. Club, **21**: 31; Rydb. Fl. Neb. 21: 17; Bull. Torr. Bot. Club, **23**: 259; Britton & Brown, Ill. Fl. **2**: 213.

Hemsley, Biol. Cent. Am. **1**: 376.

Potentilla supina Michx. Fl. Bor. Am. **1**: 304. 1803. Not L.

Lehm. Mon. Pot. 20 and 42 (in part); Sprengel, Syst. Veg. **2**: 535; Don, Gard. Diet. **2**: 557 (in part).

Pursh, Fl. Am. Sept. 356; Nutt. Gen. N. A. Pl. **1**: 310; Eat. Man. Ed. 2: 380; Ed. 7: 458; Torr. Fl. U. S. 498; Comp. 210; Ann. Lyc. Nat. Hist. N. Y. **2**: 197; Beck, Bot. 107; Ed. 2: 99; Eat. & Wr. N. Am. Bot. 373; Wats. Proc. Am. Acad. **8**: 553; Coult. Man. Rocky Mts. 84; Cont. U. S. Nat. Herb. **2**: 106; Wats. & Coult. in Gray, Man. Ed. 6: 159; Bailey in Gray F. F. & G. Bot. Rev. Ed. 151.

Hook. Fl. Bor. Am. **1**: 187; Macoun, Cat. Can. Pl. 136 and 516.

ILLUSTRATIONS: Lehm. Rev. Pot. *pl. 62, f. 3*; Britton & Brown, Ill. Fl. **2**: *f. 1925*. PLATE 5, *f. 1*; dissection of flower, *f. 2*; nearly mature pistil, *f. 3*; stamen, *f. 4*; fruiting hypanthium and calyx, *f. 5*.

Stem spreading or ascending, seldom erect, about 2–5 dm. high, leafy, at first sub-simple, later much branched, sparingly hairy, or glabrate below, hirsute above. Stipules broadly ovate, acute, 5–15 mm. long, generally toothed and ciliate. Leaves short-petioled, pinnate, the lower with 4–5 pairs of leaflets, in age nearly glabrous, and of a light green

color. Leaflets obovate-cuneate, deeply crenate or cleft with rounded obtuse teeth. Flowers about 7 mm. in diameter, in a branched leafy cyme. Cup sparingly hirsute, in age 7-9 mm. in diameter. Bractlets and sepals oblong-ovate, acute or mucronate, about equal in length. Petals yellow, obovate-cuneate, slightly truncate or emarginate, about equalling or sometimes exceeding the sepals. Stamens 15-20, with short filaments and anthers, the latter with nearly spherical sacs. Pistils very numerous; style terminal, fusiform. Achenes with a thick corky swelling on the inner side.

It has been regarded as a form of the European *P. supina*, and we still find it under that name in most manuals, notwithstanding the fact that the principal distinction has been known since the time of Nuttall. It resembles *P. supina* in the leaves, which are pinnate with several pairs of leaflets, but differs from it not only in the swollen corky attachment of the achene, but also in the stouter and more upright habit, the larger and coarser leaflets and the truly cymose inflorescence. It ranges from New York and Ontario to Washington and New Mexico, and occurs also in Mexico and eastern Asia.

14. *Potentilla Nicolletii* (Wats.) Sheldon.

Potentilla Nicolletii Sheld. Bull. Geol. and Nat. Hist. Surv. Minn. 7: 16. In part. 1884.

Rydberg, Bull. Torr. Bot. Club, 23: 260; Britton & Brown, Ill. Fl. 2: 213.

P. supina var. *Nicolletii* Wats. Proc. Am. Acad. 8: 553. 1873.

ILLUSTRATIONS: Britton & Brown, Ill. Fl. 2: f. 1926. PLATE 6, f. 1; dissection of flower, f. 2; nearly mature pistil, f. 3; stamens, f. 4; fruiting hypanthium and calyx, f. 5.

Stems spreading, more branched and more hairy than in *P. paradoxa*, very slender. Stipules broadly ovate, acute, subentire or sinuate, 5-10 mm. long. Lower leaves pinnate with few leaflets, the upper trifoliate and much reduced, sparingly hairy and thin. Leaflets obovate-cuneate with more acutish teeth than in *P. paradoxa*, the terminal generally much larger than the lateral ones, 5-25 mm. long. Flowers falsely racemose from the axils of the reduced upper leaves, about 5 mm. in diameter. Cup sparingly hirsute, in fruit very short and broad, about 6 mm. in diameter. Bracts and sepals oblong-ovate, mucronate, subequal, or the bracts a little smaller. Petals obovate-cuneate, about equalling the sepals. Stamens 10-15. Pistils numerous; style terminal, fusiform. Achenes smooth, with a thick corky swelling on the inner side.

This is much nearer the European *P. supina*, having the same prostrate habit, small leaflets and falsely racemose inflorescence, but the achenes are of the same structure as in

P. paradoxa. Only the basal leaves have several more or less distant pairs of leaflets; the lower stem leaves have generally two approximate pairs, and the rest are ternate. It is a rather rare plant. The following specimens have been examined:

North Dakota: C. A. Geyer (Nicollet's Exped.), No. 361, 1838 (type).

Missouri: B. F. Bush, 1890, 1893.

Iowa: Hitchcock.

15. *Potentilla rivalis* Nutt.

Potentilla rivalis Nutt.; Torr. & Gray, Fl. N. Am. **1**: 437. 1840.

Dietr. Syn. Pl. **3**: 178; Walp. Rep. **2**: 31; Ann. **2**: 515; Lehm. in Otto, Gart. & Blumenz. **7**: 350; Ind. Sem. Hort. Hamb. **1851**: 10; Linnaea, **25**: 313; Rev. Pot. 196.

Gray, Pl. Fend., in Mem. Am. Acad. **4**: 42; Torr. Pac. R. R. Rep. **5**: No. 4, 84; Gray in Ives' Rep. App. 11; Wats. Proc. Am. Acad. **8**: 552; Porter & Coult. Fl. Colo. **36**; Brewer & Wats. Bot. Cal. **1**: 178; Wats. & Coult. in Gray, Man. Ed. **6**: 159; K. Brandegees, Zoe, **2**: 383; Rydb. Fl. Neb. **21**: 17; Bull. Torr. Bot. Club, **23**: 260; Britton & Brown, Ill. Fl. **2**: 213.

ILLUSTRATIONS: Lehm. Rev. Pot. *pl. 61*. PLATE 7, *f. 1*; dissection of flower, *f. 2*; pistil, *f. 3*; fruiting hypanthium and calyx, *f. 4*.

Stem erect and simple, branched above, often tinged with brown or purple, villous-hirsute, leafy. Stipules broadly ovate, 1-2 cm. long, often coarsely toothed. Lower leaves pinnate with two pairs of approximate leaflets, the upper trifoliolate, sometimes all trifoliolate. Leaflets 2-5 cm. long, obovate, incised. Cyme leafy, branched, with ascending branches. Flower on short pedicels, less than 5 mm. in diameter. Hypanthium hirsute in age, about 5 mm. in diameter. Bractlets oblong, obtuse or acute, rather shorter than the ovate acute sepals. Petals cuneate, much shorter than the sepals. Stamens about 10. Pistils numerous; style terminal, fusiform. Achenes smooth.

This differs from the preceding by its upright habit, cymose inflorescence, small petals which are scarcely half as long as the sepals, and achenes without any swelling on the inner side. The leaves are generally pinnate with two pairs of approximate leaflets, except the upper ones, which are ternate. Occasionally, especially in depauperate specimens, all the leaves are ternate, when it is very difficult to separate it from the next. The range is from Oregon and Saskatchewan to Mexico. I have seen a single specimen from the stockyards of Chicago. All specimens named *P. rivalis* from the prairie States that I have seen belong to the following species.

A form of *P. rivalis* with a large cluster of basal leaves with rounded, coarsely cre-

nate leaflets, has been collected by C. V. Piper on sandy banks of Snake River, at Al-mota, Washington, in 1897.

16. *Potentilla leucocarpa* Rydberg.

Potentilla millegrana Eng.; Lehm. Ind. Sem. Hort. Bot. Hamb. 1849: 11, 1849. Not Dougl.

Lehm. Stirp. Pug. 9: 22; Rev. Pot. 202; Walp. Ann. 2: 517.

Wats. King's Rep. 5: 85; Porter, U. S. Geol. Surv. 1871: 481; Greene, Fl. Fran. 1: 65; Man. Bay Reg. 115; Rydb. Bull. Torr. Bot. Club, 23: 260; Fl. Neb. 21: 17.

Potentilla rivalis var. *millegrana* Wats. Proc. Am. Acad. 8: 553. 1873.

Brewer and Wats. Bot. Cal. 1: 178; Porter & Coulter, Syn. Fl. Colo. 36, 1874; Coult. Man. Rocky Mts. 84, 1885; Wats. and Coult. in Gray, Man. Ed. 6: 159.

Macoun, Cat. Can. Pl. 136 and 516.

Potentilla Nicotletii Sheld. Bull. Geol. and Nat. Hist. Surv. Minn. 7: 16 (in part). 1894. Not *P. supina* var. *Nicotletii* Wats. 1873.

Potentilla leucocarpa Rydberg, in Britton & Brown, Ill. Fl. 2: 212. 1897.

ILLUSTRATIONS: Britton & Brown, Ill. Fl. 2: f. 1924. PLATE 8, f. 1; dissection of flower, f. 2; pistil, f. 3; stamen, f. 4; fruiting hypanthium and calyx, f. 5.

Stem slender and branched throughout, 4-8 cm. high, divaricate, softly pubescent, sometimes nearly glabrous. Stipules lanceolate or oval, generally subentire, acute, 3-10 mm. long. Leaves ternate, finely pubescent, generally somewhat pale and thin, the lower petioles 3-8 cm. long. Leaflets oblong-cuneate, deeply serrate. Cyme much branched, leafy, but the leaves much reduced, spreading. Flowers 3-4 mm. in diameter on slender pedicels. Hypanthium soft-pubescent, in fruit about 5 mm. in diameter. Bractlets and sepals oblong-ovate, acute, about the same length, but the former a little narrower. Petals oblong-cuneate, shorter than the sepals, light yellow. Stamens generally 10, with didymous anthers. Pistils numerous; style terminal, fusiform. Achenes smooth, light colored, small.

This, as well as *P. pentandra*, has been regarded as a variety of the preceding. I think it is better, however, to consider them species. In *P. leucocarpa* all the leaves are, as a rule, ternate. The plant is much branched, with divergent branches and in the typical form spreading. This habit and the smaller, nearly white achenes separate it from forms of *P. rivalis* with ternate leaves. The plant is generally also more glabrate. It has a wide range, but is not a common plant. It extends from Illinois to New Mexico, California and Washington.

17. *Potentilla Michoacana*.

Spreading from an annual root, finely pubescent, divergently branched. Leaves ternate with shortly stalked terminal leaflets; leaflets narrowly cuneate, few-toothed above the middle, 1-2 cm. long, finely puberulent. Bractlets oblong, about equalling the broadly ovate sepals. Petals white, obovate, truncate, half the length of the sepals. Stamens 5.

Mexico, State of Michoacan: C. G. Pringle, No. 5291. 1892.

18. *Potentilla biennis* Greene.

Potentilla rivalis var. *millegrana* Torr. U. S. Expl. Exp. **17**: 289. Not Wats.

Coulter. U. S. Geol. Surv. **1872**: 765; Coville, Cont. U. S. Nat. Herb. **4**: 96.

(?) *Potentilla millegrana* Dougl.; Hook. Fl. Bor. Am. **1**: 193, as synonym under *P. Norvegica*.

Potentilla millegrana Wats. in King's. Rep. **5**: 85. In part. 1871. Not Engelm. 1849. Holzinger, Cont. U. S. Nat. Herb. **3**: 223.

Potentilla biennis Greene, Fl. Fran. **1**: 65, 1891; Man. Bay Reg. 115.

Potentilla lateriflora Rydberg, Bull. Torr. Bot. Club, **23**: 261. 1896.

Potentilla millegrana lateriflora Engelm. Rydberg, *l. c.* as synonym.

ILLUSTRATIONS; PLATE 9, *f. 1*; dissection of flower, *f. 2*; pistil, *f. 3*; stamen, *f. 4*; fruiting hypanthium and calyx, *f. 5*.

Annual or biennial. Stems often several from the root, 3-5 dm. high, terete, finely and rather densely granular-pubescent, often tinged with red or purple, simpler than in related species and with erect branches. Stipules small, ovate or oblong, entire or toothed. Leaves all ternate, the lower with petioles 2-10 cm. long, more or less hairy; leaflets broadly obovate, coarsely crenate, 2-4 cm. long and 1-3 cm. wide, the teeth often mucronulate. Flowers small, about 5 mm. in diameter, on pedicels 5-15 mm. long from the axis of upper leaves, making the branches finally resemble leafy racemes. Hypanthium glandular-pubescent, in fruit about 5 mm. in diameter. Bractlets ovate-lanceolate or oblong, acute, a little shorter than the ovate acute sepals. Petals yellow, obovate-cuneate, sometimes slightly emarginate, shorter than the sepals. Stamens about 10. Pistils very numerous; style terminal, thickened and glandular at the base; ripe achenes whitish, smooth.

This most resembles *P. leucocarpa* and is often confounded with it in our herbaria. Sometimes it is labelled *P. Norvegica*, which it resembles in the form of the leaf and general habit, but is a much more slender plant and has much smaller petals and fruiting calyx. From *P. leucocarpa* it differs in the simpler and erect stems, erect branching, falsely racemose inflorescence, broader and more hairy leaflets, and more glandular stems.

Most specimens of what has been regarded as *P. rivalis millegrana* from the Pacific States belong to this species. In the original description the cyme is said to be "mostly contracted and dense," but this is scarcely true except in a very young state. Later on it becomes very long and racemose. The leaflets are crenate rather than incised. There are two more or less distinct forms found, one with small leaves and much elongated inflorescence, the original *P. lateriflora*, and the other with large leaves and less elongated inflorescence. The latter served, if I mistake not, as the type of *P. biennis*.

It ranges from British Columbia and Assiniboia to Arizona and Lower California.

19. *Potentilla Monspeliensis* L.

Potentilla Monspeliensis L. Sp. Pl. 499. 1753.

L. Sp. Pl. Ed. 2: 714; Mill. Gard. Diet. Ed. 8: No. 7; Ait. Hort. Kew. 2: 216; Ed. 2, 3: 278; Willd. Sp. Pl. 2: 1109; Poir. in Lam. Enc. Meth. 5: 599; Persoon, Syn. Pl. 2: 56.

Rydberg, Fl. Neb. 21: 17; Cont. U. S. Nat. Herb. 3: 157 and 496; Bull. Torr. Bot. Club, 23: 262; Britt. & Brown, Ill. Fl. 2: 212.

Potentilla hirsuta Michx. Fl. Bor. Am. 1: 302. 1803.

Persoon, Syn. Pl. 2: 55; Nestl. Mon. Pot. 29 & 67; Lehm. Mon. 27 & 155; Spreng. Syst. Veg. 2: 540; Don, Gard. Diet. 2: 551; Poir. in Lam. Enc. 5: 586.

Pursh, Fl. Am. Sept. 354; Torr. Fl. U. S. 495; Comp. 209; Eat. Man. Ed. 2: 378; Ed. 3: 407; Ed. 5: 343; Ed. 6: 280; Ed. 7: 457; Beck, Bot. 106; Eat. & Wr. N. Am. Bot. 372.

Richardson, in Frankl. 1st Journ. 740; Ed. 2: App. 21. Hook. Fl. Bor. Am. 1: 193.

Potentilla Morisoni DC. Cat. Hort. Monsp. 135*; DC. Prod. 2: 573.

Fragaria Monspeliensis Crantz, Inst. 2: 179.

Potentilla Norvegica var. *hirsuta* Torr. & Gray Fl. N. Am. 1: 436. 1838.

Cham. & Schlecht. Linnaea, 2: 25; Lehm. Stirp. Pug. 9: 75; Rev. Pot. 199; Walp. Ann. 2: 516.

Macoun, Cat. Can. Pl. 136 and 516.

*Potentilla Norvegica*¹ Bigel. Florula Bost. 125. 1814.

Ell. Bot. S. C. & Ga. 1: 573; Bigel. Fl. Bost. 125; Ed. 2: 205; Pl. Bost. 218; Barton, Comp. Fl. Phil. 235; Darl. Florula Cest. 65; Fl. Cest. 303; Ed. 3: 77; Torr. & Gray, Fl. N. A. 1: 436; Torr. Fl. N. Y. 207; Hook. Journ. Bot. 6: 219; Gray, Mem. Am. Acad.

¹ In the following references, the variety may or may not be included.

1849: 42; Man. Ed. 1: 122; Ed. 2: 118; Ed. 5: 154; Pac. R. R. Rep. **12**²⁻²: 39; Cooper, *ibid.* 55; Noll, Fl. Pa. 433; Chapman, Fl. So. U. S. 124; Darby, Bot. So. States, 303; Wood, Class Book 342; Bot. & Fl. 107; Wats, King's Rep. **5**: 85; Proc. Am. Acad. **8**: 552; *l. c.* **17**: 353; Porter, U. S. Geol. Surv. **1870**: 475; **1871**: 481; Coulter, *ibid.* **1872**: 765; Port. & Coult. Syn. Fl. Col. 36; Coult. Man. Rocky Mts. 83; Wats. & Coult. in Gray, Man. Ed. 6: 159; Bailey in Gray, F. F. & G. Bot. Rev. Ed. 151.

Bongard, Veg. Ins. Sitcha, 132; Schlecht. Linnaea, **10**: 98; Ledeb. Fl. Ross. **2**: 36; Provancher, Fl. Can. 188; Seem. Bot. Herald, 51.

Potentilla rivalis Rothrock, U. S. Geog. Surv. **4**: 112, at least in part.

ILLUSTRATIONS: Nestl. Mon. Pot. *pl. 9, f. 1*; Britt. & Brown, Ill. Fl. **2**: *f. 1922*.

PLATE 10, *f. 1*; dissection of flower, *f. 2*; pistil, *f. 3*; stamen, *f. 4*; fruiting hypanthium and calyx, *f. 5*.

Stems stout and very leafy, 3-8 dm. high, ascending or erect, often tinged with red or brown, often several from the annual or biennial root, branched above, hirsute with long and spreading hairs. Stipules broadly ovate, 1-4 cm., generally toothed. Lower leaves with hirsute petioles 3-10 cm. long, the uppermost subsessile, more or less hirsute, all digitately 3-foliolate or, in luxuriant forms, the lower sometimes digitately or pinnately 5-foliolate. Leaflets obovate, 3-10 cm. long, serrate (in the native form) with generally broad teeth. Cyme generally dense and leafy. Flowers on short pedicels, about 1 cm. in diameter. Cup hirsute, in fruit about 1 cm. in diameter, and with the sepals of about the same length. Bracts and sepals oblong-lanceolate, acute, nearly of the same length. Petals light yellow, obovate, nearly equalling the sepals. Stamens generally 20, sometimes only 15; anthers cordate, didymous. Pistils numerous; style terminal, fusiform and glandular below. Achenes often rugulose when ripe.

This is the stoutest of the group. It differs from the related species with ternate leaves in the size of the petals and the fruiting hypanthium; the former about equal the sepals in length and the latter often becomes 1 cm. in diameter. It is also more coarsely hirsute. It ranges from Labrador to the District of Columbia westward across the continent, and in the Rockies, south to Mexico. Also in eastern Asia.

***Potentilla Monspeliensis* Norvegica (L.).**

Potentilla Norvegica L. Sp. Pl. 499. 1753.

L. Sp. Pl. Ed. 2: 715; Oeder, Fl. Dan. *pl. 171*; Willd. Sp. Pl. **2**: 1109; Poir. in Lam. Enc. Meth. **5**: 600; Ait. Hort. Kew. Ed. 2, **3**: 279; Persoon, Syn. Pl. **2**: 56; Nestler, Mon. Pot. 29 and 66; Lehm. Mon. 29 and 153; Spreng. Syst. Veg. **2**: 540;

Don, Gard. Diet. **2**: 550; Dietr. Syn. **3**: 178; Walp. Rep. **2**: 31; Walp. Ann. **2**: 515; Lehm. Rev. Pot. 198; DC. Prod. **2**: 573.

Michx. Fl. Bor. Am. **1**: 302; Pursh, Fl. Am. Sept. 354; Torr. Fl. U. S. 496; Comp. 209; Eat. Man. Ed. 2: 379; Ed. 3: 407; Ed. 5: 343; Ed. 6: 280; Ed. 7: 457; Eat. & Wr. N. Am. Bot. 372; Beck, Bot. 106; Ed. 2: 98.

Hook. Fl. Bor. Am. **1**: 193; Macoun, Cat. Can. Pl. 136 and 516; Richardson, Frankl. 1st Journ. 739; Ed. 2: App. 20.

Potentilla dichotoma Moench, Meth. 659.

Potentilla geminiflora Schrank. in Regensb. Bot. Zeit. 1823, 216.*

Potentilla grossa Dougl.; Hook. Fl. Bor. Am. **1**: 193, as synonym.

? *Potentilla millegrana* Douglas; l. c.

Fragaria parviflora Lam. Fl. Fr. **3**: 113.

Potentilla fragariaefolia Hoppe; Lehm Rev. Pot. 198, as synonym. 1856.

Potentilla trifolia Gilib. Fl. Lith. **5**: 249.*

Potentilla trifoliata Gilib. Syst. Pl. Europ. Supp. 361.*

Fragaria Norvegica Crantz, Inst. **2**: 179.

Fragaria dubia Crantz, Stirp. Inst. Fasc. **2**: 24.*

ILLUSTRATIONS; Dietr. Fl. Boruss. **12**: *pl. 797*;* Fl. Dan. *pl. 171*; Sturm, Deutschl. Fl. 92: *pl. 2*.*

Leaflets oblong rather than obovate, pubescence fine, rarely with longer hairs.

The form common in Europe and Western Asia is comparatively rare in this country and seems to be introduced, as it is most common on the east coast. The true *P. Monspeliensis* is evidently a native.

POTENTILLA LABRADORICA Lehm. Ind. Sem. Hort. Bot. Hamb. **1849**: 12. 1849.

Stirp. Pug. **9**: 12; Rev. Pot. 201; Walp. Ann. **2**: 516; Rydb. Bull. Torr. Bot. Club, **23**: 262.

This has generally been included in *P. Monspeliensis*. From Lehmann's description it seems quite distinct, differing in being very low, 1-3-flowered, nearly glabrous, with leaves resembling those of *P. nana*, large stipules and larger flowers. I have not seen any specimens. A form of *P. Monspeliensis*, nearly glabrous, and with larger flowers has been collected by A. P. Low (No. 4986, 1894), and Spreadborough (No. 16316, 1896), but it is not subcaulescent as the description of *P. Labradorica* calls for.

20. *Potentilla pentandra* Engelm.

Potentilla pentandra Engelm.; Torr. & Gray, Fl. N. Am. **1**: 447. 1840.

Dietr. Syn. Pl. **3**: 184; Walp. Rep. **2**: 35; Ann. **2**: 515; Lehm. Stirp. Pug. **9**: 75; Rev. Pot. 197.

Rydberg, Cont. U. S. Nat. Herb. **3**: 157; Bull. Torr. Bot. Club, **23**: 262; Fl. Neb. **21**: 17; Britton & Brown, Ill. Fl. **2**: 212.

Potentilla rivalis var. *pentandra* Wats. Proc. Am. Acad. **8**: 553. 1873.

Wats. & Coult. in Gray, Man. Ed. **6**: 159.

ILLUSTRATIONS: Lehm. Rev. Pot. *pl.* 62, *f.* 4; Britton & Brown, Ill. Fl. **2**: *f.* 1923.

PLATE 11, *f.* 1; dissection of flower, *f.* 2; pistil, *f.* 3; stamen, *f.* 4; fruiting hypanthium and calyx, *f.* 5.

Stems stout, very leafy, 3–7 dm. high, erect, often tinged with brown, finely hirsute and much branched above. Stipules broadly ovate-acuminate, 1–2 cm. long, deeply toothed. Lower leaves pedately 5-foliolate, or 3-foliolate with the lateral leaflets 2-cleft, with hirsute petioles 3–8 cm. long; the uppermost 3-foliolate and very short-petioled. Leaflets 2–10 cm. long, oblong to oblanceolate or cuneate, deeply serrate. Cyme very dense and leafy, in age, as a rule, flat-topped. Flowers on short hirsute pedicels, less than 5 mm. in diameter. Cup sparingly hirsute and finely pubescent, in age about 5 mm. in diameter. Bractlets oblong, acute, nearly as long as the ovate acute sepals but much narrower. Petals pale yellow, obovate, scarcely half as long as the sepals. Stamens seldom more than 5, very small, with didymous anthers. Pistils exceedingly numerous; style terminal, short-fusiform and glandular below. Achenes smooth, brownish.

P. pentandra is characterized by its leaves, which are pedately 5-foliolate or 3-foliolate with the lateral leaflets cleft to near the base, by the exceedingly numerous small flowers in a somewhat flat-topped cyme, by remarkably small petals and generally only five stamens. It is often as stout as *P. Monspeliensis* and more bushy. Its range is from Missouri and Iowa to Alberta and Arkansas. Specimens studied:

Missouri: G. Engelmann, No. 970, 1835 (type); B. F. Bush, 1893, No. 280, 1895.

Iowa: Hitchcock; J. C. Arthur, 1874.

Nebraska: H. J. Webber, 1888; P. A. Rydberg, No. 1819, 1893; Fred. Clements, No. 2655, 1893; C. E. Bessey, 1890.

North Dakota: E. L. Greene, 1890.

Minnesota: C. A. Ballard, No. 252.

Manitoba: Macoun, No. 12580, 1896.

Alberta: Macoun, No. 626, 1885.

§ 5. ARGENTEAE.

21. *Potentilla intermedia* L.

Potentilla intermedia L. Mant. Pl. 76. 1767.

Willd. Sp. Pl. 2: 1101; Poir. in Lam. Enc. Meth. 5: 590; Ait. Hort. Kew. Ed. 2, 3: 276; Persoon, Syn. Pl. 2: 54; Haller, Syn. Pot. 54; Ser. in DC. Prodr. 2: 577; Ledeb. Fl. Ross. 2: 49; Lehm. Rev. Pot. 102; Don, Gard. Diet. 2: 554; Dietrich, Syn. Pl. 3: 182; Walp. Ann. 2: 493.

Rydb. Bull. Torr. Bot. Club, 24: 9; Britt. & Brown, Ill. Fl. 2: 210.

Potentilla digitata-flabellata A. Br. & Bouché, Ind. Sem. Hort. Ber. 1851: 3. 1851.

Lehm. Rev. Pot. 101. 1856.

ILLUSTRATIONS: Lehm. Rev. Pot. *pl.* 41; Britt. & Brown, Ill. Fl. 2: *f.* 1916. PLATE 12, *f.* 1; dissection of flower, *f.* 2; pistil, *f.* 3; stamen, *f.* 4; fruiting hypanthium and calyx *f.* 5.

Stem 4–7 dm. high, generally ascending, very leafy and much branched, green or tinged with brown or purple, finely pubescent with sparse long hairs. Stipules ovate, acute, mostly entire. Leaves green and finely hirsute on both sides and somewhat tomentulose beneath the basal on petioles 1–2 dm. long, digitate, with 5 obovate leaflets 3–6 cm. long. Stem leaves quinate or ternate, with oblong or oblanceolate leaflets, the lower short-petioled, the upper sessile, the teeth ovate-oblong, rather obtuse. Hypanthium hirsute, in fruit 6–8 mm. in diameter. Bractlets oblong or oblong-oval, obtuse or acute, nearly equalling the triangular-ovate acute sepals. Flowers nearly 1 cm. in diameter. Petals obcordate, about equalling the sepals.

This species greatly resembles *P. Monspeliensis*, especially var. *Norvegica*, and in this country it has been mistaken for it. It differs mainly in the mostly 5-foliolate leaves, the perennial root and the style. The species is sparingly introduced in the East. Some of the specimens examined are:

New Jersey and *New York*: Addison Brown, 1880 and 1881.

Massachusetts: M. L. Fernald, 1891.

Michigan: G. H. Hicks.

Mr. Fernald's specimens have deeper incised leaflets, especially the middle one, and resemble perfectly specimens of *P. digitato-flabellata* sent to Dr. Gray from the Botanic Garden at Danzig. This species is said to be a native of North America but I cannot find any character that would separate it from *P. intermedia*.

22. *Potentilla inclinata* Vill.

Potentilla inclinata Vill. Hist. Pl. Dauph. **3**: 567. *pl.* 45. 1789.

Willd. Sp. Pl. **2**: 1102; Poir. in Lam. Enc. Meth. **5**: 591; Persoon, Syn. Pl. **2**: 54; Haller, Syn. Pot. 55; Walp. Ann. **2**: 492; Ledeb. Fl. Ross. **2**: 47; Lehm. Rev. Pot. 100.¹
Rydb. Bull. Torr. Bot. Club, **24**: 9.

Potentilla canescens Besser, Pr. Fl. Gall. **1**: 330. 1809.*

Ser. in DC. Prod. **2**: 578; Spreng. Syst. **2**: 537; Lehm. Mon. 47; Nestler, Monog. 47.

Potentilla pilosa Macoun, Cat. Can. Pl. 139 and 517. 1883-6. Not DC.

ILLUSTRATIONS: Sturm, Deutschl. Fl. **91**: *pl.* 8,* Vill. Hist. Pl. Dauph. **3**: *pl.* 45.

Stem rather simple, erect, or seldom decumbent at the base, leafy, more or less grayish-tomentulose and sparingly hirsute, branched above with rather erect branches. Stipules lanceolate, entire. Leaves, except the uppermost, quinate, silky-hirsute on both sides and grayish-tomentulose beneath. Leaflets oblanceolate, deeply toothed with oblong, rather acute teeth. Hypanthium hirsute, and tomentulose, in fruit 7-10 mm. broad. Bractlets lanceolate, acute, equalling the ovate-lanceolate acute sepals. Petals obovate, slightly emarginate, equalling the calyx.

This closely resembles the preceding species, but differs in a more slender and simple stem and the grayish pubescence. The only specimens found on this continent that I have seen are those collected in Ontario by J. Fowler 1886 and 1895.

23. *Potentilla collina* Wibel.

Potentilla collina Wibel, Prim. Fl. Werth. **2**: 267. 1799.

Lehm. Mon. 24 and 99; DC. Prod. **2**: 577; Sprengel, Syst. Veg. **2**: 537; Don, Gard. Diet. **2**: 554; Dietr. Syn. Pl. **3**: 182; Walp. Ann. **2**: 492; Lehm. Rev. Pot. 98².

Rydb. Bull. Torr. Bot. Club, **24**: 9; Britt. & Brown, Ill. Fl. **2**: 209.

Stems many from the rootstock, spreading or ascending, weak, glabrous or tomentose. Stipules small, less than 5 mm. long, lanceolate, acuminate. Basal leaves many, on long petioles 1-1½ dm. long, digitate with 5 leaflets, smooth or puberulent above, grayish-tomentose beneath. Leaflets broadly cuneate, 15-25 mm. long, deeply toothed above the middle with oblong-ovate obtuse teeth, and with flat, not revolute margins. The upper stem leaves are ternate with oblong few-toothed leaflets. Hypanthium grayish-tomentose, in fruit 5-7 mm. broad. Bractlets and sepals subequal, oblong, obtuse or acute. Petals obcordate, cuneate, emarginate, a little exceeding the calyx.

This is another species that has been collected in this country at least twice, viz., by J. M. Holzinger (No. 30) at Winona, Minn., in 1887, and by M. L. Fernald in Massachusetts, 1894. It differs from *P. argentea*, which it most closely resembles, by its prostrate or spreading habit, less white-tomentose leaves, which have broader lobes, and flat, not revolute margins.

¹The numerous synonyms of this species are omitted as they have no reference to North American botany. See Lehmann, *l. c.*

²The synonyms and most references are omitted, as they have no bearing upon North American botany.

24. *Potentilla argentea* L.

Potentilla argentea L. Sp. Pl. 497. 1753.

L. Sp. Pl. Ed. 2: 712; Mill. Gard. Diet. Ed. 8: no. 5; Ait. Hort. Kew. 2: 215; Ed. 2, 3: 276; Dietr. Pflanz. Ed. 2: 91; Willd. Sp. Pl. 2: 1101; Poir. in Lam. Enc. Meth. 5: 590; Persoon, Syn. Pl. 2: 54; Nestl. Mon. Pot. 26 and 48; Haller, Syn. Pot. 55; Lehm. Mon. 24 and 94; Sprengel, Syst. Veg. 2: 537; Seringe in DC. Prod. 2: 576; Don, Gard. Diet. 2: 553; Dietr. Syn. Pl. 3: 181; Walp. Rep. 2: 33; Ann. 2: 490; Ledeb. Fl. Ross. 2: 47; Lehm. Rev. Pot. 96.

Pursh, Fl. Am. Sept. 355; Bigelow, Fl. Bost. 124; Ed. 2: 204; Nutt. Gen. N. A. Pl. 1: 310; Eat. Man. Ed. 2: 379; Ed. 3: 408; Ed. 5: 344; Ed. 6: 280; Ed. 7: 457; Torr. Fl. U. S. 497; Comp. 210; Beck, Bot. 107; Ed. 2: 99; Torr. & Gray, Fl. N. Am. 1: 441; Eat. & Wr. N. Am. Bot. 373; Gray, Man. 122; Ed. 2: 118; Ed. 5: 154; Noll, Fl. Pa. 433; Wood, Class Book, 343; Am. Bot. & Fl. 107; Wats. Proc. Am. Acad. 8: 558; Wats. & Coult. in Gray, Man. Ed. 6: 160; Bailey in Gray, F. F. & G. Bot. Rev. Ed. 152; Rydb. Bull. Torr. Bot. Club, 24: 9; Britton & Brown, Ill. Fl. 2: 209.

Lehm. in Hook. Fl. Bor. Am. 1: 191; Provancher, Fl. Can. 189; Macoun, Cat. Can. Pl. 139 and 517.

Potentilla argentea dentata Beck, Bot. 107. 1833.

ILLUSTRATIONS: Dietr. Boruss. 4: *pl.* 273,* Sturm, Deutschl. Fl. 17: *pl.* 5,* Engl. Bot. *pl.* 89; Britt. and Brown, Ill. Fl. *f.* 1914. PLATE 13, *f.* 1; dissection of flower, *f.* 2; pistil, *f.* 3; stamen, *f.* 4; fruiting hypanthium and calyx, *f.* 5.

Stems many from the rootstock, rather bushy, branched and leafy, 1-5 dm. high, ascending, grayish-tomentose, or glabrate in age, often tinged with brown or purple. Stipules from ovate-lanceolate and rarely 2-3-toothed to nearly linear and entire. Leaves digitate, all except the uppermost with 5 leaflets, glabrous and green above, white-tomentose beneath, rather coriaceous; leaflets obovate or cuneate, entire at the base, then deeply divided into narrow oblong or linear divisions which are acute and with revolute margins. Hypanthium tomentose, in fruit seldom over 5 mm. in diameter. Bractlets oblong, obtuse, nearly equalling the ovate acute mucronate or obtuse sepals. Petals obovate-cuneate, emarginate, scarcely exceeding the calyx.

P. argentea is one of the easiest species to identify, by its small flowers, deeply dissected leaves, which are white-tomentose, especially beneath, and have revolute margins. It is a native of Europe and Asia, probably also of America. In this country it extends from Nova Scotia to the District of Columbia, Dakota and Kansas.

§ 6. CONCINNAE.

25. *Potentilla concinna* Richards.

Potentilla concinna Richardson, in Frankl. 1st Journ. 739. 1823. Ed. 2: App. 20. Don, Gard. Dict. 2: 554; Dietr. Syn. Pl. 3: 183; Walp. Rep. 2: 34; Ann. 2: 488; Lehm. Mon. Suppl. 1: 16; Stirp. Pug. 2: 13; Rev. Pot. 112.

Eat. Man. Ed. 7: 457; Torr. & Gray, Fl. N. Am. 1: 443; Eat. & Wr. N. Am. Bot. 373; Gray, Am. Journ. Sc. (II) 33: 411 (Rep. 22); Proc. Acad. Phil. 1863: 61; Rydberg, Cont. U. S. Nat. Herb. 3: 497; Bull. Torr. Bot. Club, 23: 431.

Lehm. in Hook. Fl. Bor. Am. 1: 193.

Potentilla humifusa Nutt. Gen. N. Am. Pl. 1: 310. 1818. Not Willd. 1813.

Seringe in DC. Prod. 2: 574; Walp. Rep. 2: 34.

Torr. Ann. Lyc. N. Y. 2: 197; Eat. Man. Ed. 7: 459; Torr. & Gray, Fl. N. Am. 1: 443; Eat. & Wright, N. Am. Bot. 374; Wats. Proc. Am. Acad. 8: 558; Rothrock, in Wheeler's Exp. 4: 113; Porter & Coult. Syn. Fl. Colo. 37; Coult. Man. Rocky Mts. 85.

Macoun, Cat. Can. Pl. 139 and 518.

Potentilla concinna humifusa Lehm. Stirp. Pug. 9; Rev. 112; Walp. Ann. 2: 488.

Potentilla concinna humistrata Rydb. Cont. U. S. Nat. Herb. 3: 497. 1896.

Potentilla pulchella Sprengel, Syst. Veg. 4: Cur. Post. 199. 1827.

Tormentilla humifusa Don, Gard. Dict. 2: 562.

ILLUSTRATIONS: Hook. Fl. Bor. Am. 1: *pl.* 67; Lehm. Mon. Suppl. *pl.* 7. PLATE 14, *f.* 1; dissection of flower, *f.* 2; pistil, *f.* 3; stamen, *f.* 4; fruiting hypanthium and calyx, *f.* 5.

Low and diffuse; stems many from the caudex in the typical form, generally spreading, more or less tomentose. Stipules ovate-lanceolate, acuminate. Leaves densely white-tomentose beneath, silky and slightly tomentose above when young, digitate (sometimes approximately pinnate), of 5 leaflets; leaflets obovate or cuneate, more or less deeply toothed, 1-3 cm. long. Hypanthium silky-villous and tomentose, in fruit 8-10 mm. in diameter. Bractlets oblong, obtuse or mucronate, nearly equalling the ovate sepals. Petals obcordate, a little exceeding the sepals.

P. concinna resembles *P. nivalis* and *P. quinquefolia* in many respects, but is always more or less prostrate, and has broader petals and sepals. It is very variable as to the shape of the leaves. It ranges from Colorado to Utah and Saskatchewan.

Potentilla concinna humistrata Rydberg, Cont. U. S. Nat. Herb. 3: 497 (*P. concinna humifusa* Lehm. Rev. Pot. 112; *P. humifusa* Nutt. Gen. 1: 310) is a less spreading form

with leaves green on the upper surface, but the two forms grade into each other in so many ways that it is useless to try to draw a line between them.

Potentilla concinna divisa Rydberg.

P. nireca dissecta S. Wats. Proc. Am. Acad. 8 : 559, at least in part. 1873. Not *P. dissecta* Pursh, 1814.

Potentilla concinna divisa Rydberg, Bull. Torr. Bot. Club, 23 : 431. 1896.

ILLUSTRATIONS : PLATE 14, f. 6.

Leaflets pinnately divided. In a few specimens the leaves are also pinnate rather than palmate.

Dr. Watson included the first three specimens cited below in his *P. nireca dissecta*, but they are much nearer in every respect *P. concinna* than *P. nireca*, the sepals, petals and general habit being exactly that of the former.

Rocky Mountains : Douglas.

Montana : Howard.

South Dakota : Jenney, 1875 ; W. H. Forwood, 1887 ; P. A. Rydberg, Nos. 672 and 673, 1892.

Assiniboia : John Macoun, No. 4541, 1894 ; Nos. 10468 and 10469, 1895.

Manitoba : Macoun, No. 12623, 1895.*

26. *Potentilla oblanceolata*.

Stems several from the caudex, decumbent or spreading, about 1 dm. long, with few leaves silky-villous. Basal leaves numerous, digitately 5-foliolate, silky and green above, densely white-tomentose beneath ; leaflets narrowly oblanceolate, serrate with small upwardly directed teeth, 3–5 cm. long ; stem leaves trifoliolate or simple. Hypanthium silky and white-tomentose ; bractlets narrowly lanceolate, nearly equalling the similar sepals. Petals yellow, broadly obcordate, exceeding the sepals by about one-third. Stipules brown and decurrent, the free portion long, linear-lanceolate.

It is nearest related to *P. concinna*, but differs by its narrower sepals and bractlets, its narrowly oblanceolate leaflets and their dentition.

Mexico, S. W. Chihuahua : Dr. E. Palmer. 1885 (type in U. S. Nat. Herb.).

27. *Potentilla bicrenata* Rydberg.

Potentilla bicrenata Rydb. Bull. Torr. Bot. Club, 23 : 431. 1896.

ILLUSTRATIONS : PLATE 15, f. 1 : dissection of flower, f. 2 ; pistil, f. 3 ; stamen, f. 4 ; fruiting hypanthium and calyx, f. 5.

Low and simple from an erect scaly rootstock. Stem erect, 5–7 cm. high, about equalling the leaves, 1–3-flowered, nearly leafless. Basal leaves with petioles 3–6 cm. long, digitately 5-foliolate, silky and greenish above, white-tomentose beneath; leaflets .5–2 cm. long, oblong-cuneate, margins entire, except at the very apex, where there are 2 (seldom 4) notches making the leaflets 3- (seldom 5-) toothed at the apex, the middle tooth generally the smallest. Flowers about 1 cm. in diameter. Hypanthium silky; bractlets and sepals ovate or lance-ovate, the former smaller. Petals obovate, merely truncate.

This much resembles *P. concinna*, but is more delicate, not at all spreading, has a subscapiform stem and smaller flowers, but the most striking difference is the form of the leaflets.

New Mexico: C. D. Walcott, No. 66, 1883 (Type).

Colorado: E. L. Greene, 1875.

28. *Potentilla concinnaeformis*.

ILLUSTRATIONS: PLATE 15, *f. 6*; dissection of flower, *f. 7*; pistil, *f. 8*; stamen, *f. 9*; fruiting hypanthium and calyx, *f. 10*.

Stems from a scaly caudex, about 1 dm. high, ascending, slightly silky-strigose, subscapose. Lower stipules scarious and brown, those of the small stem leaves ovate. Basal leaves numerous, densely silvery silky on both sides and slightly tomentose beneath, digitate, of about 7 leaflets. Stem leaves small, simple or ternate; leaflets 1–2 cm. long, oblong-cuneate, crenate except at the base. Hypanthium silky-villous, in fruit about 5 mm. in diameter. Bractlets oblong-lanceolate, about a third shorter than the broadly lanceolate sepals. Petals yellow, obcordate, a third longer than the sepals. Stamens about 20.

It most resembles *P. concinna*, but is more silky and less tomentose and its stems are not prostrate. It has been labelled *P. Wheeleri*, from which it is easily distinguished by its denser and appressed silky pubescence, the tomentum of the lower surface of the leaves, and the sepals, which are not incurved in fruit. It is a native of the San Francisco Mountains of Arizona.

Arizona: J. G. Lemmon, No. 3294 (Mt. Agassiz, 10000 ft.), Aug. 1884; Mr. and Mrs. Lemmon, Sept., 1884.

§ 7. SUBVISCOSAE.

29. *Potentilla Wheeleri* Wats.

Potentilla Wheeleri Wats. Proc. Am. Acad. 11: 148. 1876.

Wats. Bot. Cal. 1: 179; Rattan, An. Key. W. Coast Bot. 51; Greene, Fl. Fran.

1: 64; Coville, Cont. U. S. Nat. Herb. 4: 96; Brandege, Zoe, 4: 205, 1893; Rothrock, Wheeler Surv. 4: 360; Rydb. Bull. Torr. Bot. Club, 23: 429.

ILLUSTRATIONS: Rothrock, Wheeler Surv. *pl. 3, f. B.* PLATE 16, *f. 1*; dissection of flower, *f. 2*; pistil, *f. 3*; stamen, *f. 4*; fruiting hypanthium and calyx, *f. 5*.

Stems many from the caudex, 5–10 cm. long, spreading or decumbent, branched and many-flowered, silky-villous. Stipules ovate, acute, subentire. Basal leaves many with petioles 2–6 cm. long, digitate, of 5 leaflets, equally silky or hirsute-villous on both sides; leaflets cuneate to obovate, crenate at the rounded summit, 1–1.5 cm. long. Stem leaves smaller and often ternate. Hypanthium silky-villous, in fruit 5–7 mm. in diameter. Bractlets oblong, obtuse, a little shorter than the ovate, rather acutish sepals. Petals obcordate, a little exceeding the calyx. Stamens 20. Pistils about 20. Style filiform.

The pubescence is quite densely silky, and the typical form is apparently without glands. The petals are obcordate, slightly contracted at the base, and a little exceed the calyx. It has been collected in southern California, Arizona and northern Mexico. The following specimens have been examined:

California: Rothrock, No. 324, 1875; Parry & Lemmon, No. 100, 1876; Coville & Funston, No. 1672, 1891; in part; S. B. Parish, No. 1498, 1882; No. 2363, 1892; No. 3146, 1894.

Lower California: T. S. Brandege, 1893.

Potentilla Wheeleri viscidula Rydberg.

Potentilla Wheeleri Coville, Cont. Nat. Herb. 4: 96. In part. 1893.

Potentilla Wheeleri viscidula Rydberg, Bull. Torr. Bot. Club, 23: 429. 1896.

Subcespitose, rather hirsute with spreading hairs, somewhat glandular-granuliferous on the calyx, pedicels, etc.; leaflets shorter and broader, generally less than 1 cm. long.

The following specimens have been seen by me:

Arizona: C. G. Pringle, 1881; J. G. Lemmon, No. 158, 1881.

California: W. G. Wright, 1879; Coville & Funston, No. 1672, 1891, in part.

Pringle labelled his specimens *Potentilla subviscosa* Greene (near *P. Wheeleri* Wats.). I think, however, that they should be referred to *P. Wheeleri* rather than to *P. subviscosa*, as they do not have the dissected leaves and the subunguiculate petals of *P. subviscosa*.

30. Potentilla subviscosa Greene.

Potentilla subviscosa Greene, Bull. Torr. Bot. Club, 8: 97. 1881.

Rydb. Bull. Torr. Bot. Club, 23: 430.

ILLUSTRATIONS : PLATE 16, *f. 6* ; dissection of flower, *f. 7* ; stamen, *f. 8* ; pistil, *f. 9* ; fruiting hypanthium and calyx, *f. 10*.

Stems many from the caudex, prostrate or spreading, sparingly hirsute, and glanduliferous especially upward. Stipules ovate-lanceolate, acute, entire. Basal leaves numerous, with petioles 3–5 cm. long, sparingly hirsute, puberulent and glanduliferous, digitately (or seldom closely pinnately) 5-foliolate with the lower leaflets smallest. Stem leaves reduced and ternate ; leaflets 1–4 cm. long, obovate or cuneate in outline, deeply cleft into oblong or linear-oblong divisions, and the middle one often 3-divided to near the midrib. Hypanthium glanduliferous and puberulent, in age generally brownish and 5–7 mm. in diameter. Bractlets oblong-ovate, obtuse, shorter than the ovate, acute or obtuse sepals. Petals cuneate or spatulate, about one-half longer than the sepals. Style short, glandular-thickened at the base.

Differs from *P. Wheeleri* in the leaflets, which are deeply cleft into oblong divisions, and the middle one often 3-divided to near the midrib, in the petals, which are more or less plainly unguiculate and about one-half longer than the sepals, in the more hirsute pubescence which is intermixed with numerous glands. A specimen collected at Fort Apache, Arizona, by Mrs. R. W. Hoyt, has pinnate basal leaves with approximate spatulate leaflets. The species ranges from New Mexico and Arizona to northern Mexico.

New Mexico : E. L. Greene, 1881 (type).

Arizona : D. J. MacDougal, No. 8, 1891 ; Mrs. Hoyt, 1893.

Mexico : C. V. Hartman, No. 638, 1891.

31. *Potentilla ramulosa* Rydb.

Potentilla ramulosa Rydb. Bull. Torr. Bot. Club, **23** : 430. 1896.

ILLUSTRATIONS : Bull. Torr. Bot. Club, **23** : *pl. 276*. PLATE 17.

Stems several from the thick perennial root, about 1 dm. high, scarcely exceeding the basal leaves, more or less hirsute, and branched. Stipules lanceolate, the lower scarious and brown, the upper herbaceous. Basal leaves with hirsute petioles 5–8 cm. long, finely pubescent, in age shining ; leaflets 5–7, obovate, coarsely and generally doubly toothed with somewhat divergent teeth, prominently veined beneath, the larger 5–7 cm. long. Flowers slender-pedicelled in an open cyme. Hypanthium and pedicels hirsute and with numerous sessile glands ; bractlets oblong, a little shorter than the oblong-ovate sepals, both distinctly veined, in fruit incurved and enclosing the rather few large achenes. Petals obcordate, deeply emarginate and evidently contracted in a short claw. Stamens 15–20. Pistils rather few. Achenes striate.

P. ramulosa resembles *P. subviscosa*, but is a much larger plant. The leaves, by their size, pubescence and form, remind one somewhat of *P. Nuttallii* and *P. Blaschkeana*. The leaflets reach a length of even 7 cm. The general habit, form of calyx and corolla, etc.; are those of *P. subviscosa*, but the achenes are striate. The following specimens have been examined;

Arizona: J. G. Lemmon, No. 399, 1881; H. H. Rusby, 1883; G. C. Nealley, No. 110, 1891.

§ 8. AUREAE.

32. *Potentilla Sierrae-Blancae* Wooton & Rydberg.

ILLUSTRATIONS: PLATE 18, *f. 3*; pistil, *f. 4*; fruiting hypanthium and calyx, *f. 5*.

Perennial, with a branched caudex covered with the brown remains of stipules and leaf-stalks. Basal leaves numerous, with slender petioles 3–5 cm. long, digitately 5-foliate, almost perfectly glabrous and dark green; leaflets 1–2 cm. long, almost oblong-linear, slightly tapering downward, entire except the 3-toothed apex. Stipules lanceolate, ciliate. Flowering stems very slender, almost leafless and generally 1-flowered, 4–6 cm. long, scarcely exceeding the leaves, finely and sparingly villous. Hypanthium slightly villous, in fruit about 5 mm. in diameter; bractlets linear-oblong, obtuse, about a third shorter than the ovate-lanceolate sepals. Petals unknown.

In the habit and form of the leaves this most resembles *P. bicrenata*, but is more tufted and almost glabrous. It has been collected only in fruit.

New Mexico: E. O. Wooton, No. 469 (type), collected in the White Mountains, Aug. 16, 1897.

33. *Potentilla ranunculoides* Humb. & Bonpl.

Potentilla ranunculoides Humb. & Bonpl.; Nestler, Mon. Pot. 26 and 56. 1816.

Lehm. Mon. 25 and 114; Poir. Suppl. 4: 542; DC. Prod. 2: 576; Sprengel, Syst. Veg. 2: 537; H.B.K. Nov. Gen. et Sp. 4: 216; Hemsley, Biol. Cent. Am. 1: 376; Don, Gard. Diet. 2: 553; Dietr. Syn. Pl. 3: 181; Walp. Ann. 2: 498; Rydb. Bull. Torr. Bot. Club, 23: 397.

Potentilla macrorhiza Willd.; Schlecht. Mag. Ges. Naturf. Fr. Berlin, 7: 292.*

ILLUSTRATIONS: Nestler, Mon. Pot. *pl. 3, f. 1*.

Stem short, erect, few-leaved and few-flowered, slightly silky-strigose. Basal leaves digitately 5–7-foliate; stem leaves small, ternate, all glabrous except on the veins and the margins; leaflets rounded-ovate, thick, strongly veined, crenate above the middle; bractlets oblong, obtuse, about half as long as the lanceolate acuminate sepals. Petals obovate, one-half longer than the sepals.

Near the base of the mountains of Central Mexico.

State of Mexico: C. G. Pringle, No. 4220, 1892; Humboldt & Bonpland; W. Nelson, 633 and 691, 1894; *Linden, No. 662; *Galeotti, No. 3077; *Bourgeau, No. 1050.

32. *Potentilla maculata* Pourr.

Potentilla verna L. Sp. Pl. 498. In part. 1753. Wahl. Fl. Ups. 175.

Potentilla maculata Pourr. Act. Toloss. 3: 316. 1788.

Lehm. Rev. Pot. 119; Schlecht. Linnaea, 10: 98; Walp. Ann. 2: 494.

E. Meyer. Pl. Labr. 75; Wats. Proc. Am. Acad. 8: 559; Lange, Consp. Fl. Groenl. 6 and 234; Rosenvinge, *ibid.* 655; Macoun, Cat. Can. Pl. 140 and 518; Nathorst, Oefv. Kong. Vet. Ak. Förh. 1884: 31 and 46.

Potentilla Salisburgensis Haenke; Jacq. Coll. 2: 68; Icon. Rar. 3: *pl.* 490; Koch, Syn. 216; Dietr. Syn. Pl. 3: 181; Walp. Rep. 2: 33.

Torr. and Gray, Fl. N. Am. 1: 440; Ledeb. Fl. Ross. 2: 55.

Potentilla crocea Haller; Schlecht. Cat. Pl. Helv. 1807.*

Lehm. Mon. Pot. 111; Hornem. Pl. Ed. 3, 572*; Spreng. Syst. Veg. 2: 537; Hook. f. Journ. Linn. Soc. 1: 116.

Potentilla opaca La Peyr. Hist. Abr. Pl. Pyr. 288. 1813.

Spreng. Syst. Veg. 2: 538 (in part); Dietr. Syn. Pl. 2: 181 (in part); Walp. Rep. 2: 34.

Pursh, Fl. Am. Sept. 355. Nutt. Gen. 1: 310; Eat. Man. Ed. 5: 344; Ed. 6: 280; Ed. 7: 457; Lehm. in Hook. Fl. Bor. Am. 1: 191; E. Meyer, Pl. Lab. 75; Torr. and Gray, Fl. N. Am. 1: 440; Schlecht. Linnaea, 10: 98; Eat. and Wr. N. Am. Bot. 373.

Potentilla alpestris Hall. f. Ser. Mus. Helv. 1: 53. 1818.*

Potentilla rubens Rydb. Bull. Torr. Bot. Club, 23: 395; Britton and Brown, Ill. Fl. 2: 209. Not Vill. 1779.

Potentilla dubia Suter, Fl. Helv. 1: 308 (ex parte, fide Lehm).

Potentilla aurca Salisburgensis DC. Prod. 2: 576. 1825.

Potentilla verna Salisburgensis Willd. Sp. Pl. 2: 1104; Nestl. Mon. Pot. 52.

Potentilla aurca β Durand, Journ. Acad. Phil. 1856: 191. 1856.

ILLUSTRATIONS: Ser. Mus. Helv. 1: *pl.* 8, *f.* *a* and *b**; Eng. Bot. 8; *pl.* 561; Fl. Dan. 1: *pl.* 114; Sturm, Deutschl. Fl. 17: *pl.* 5*; Jacq. Icon. Plant. Rar. 3: *pl.* 490; Britt. & Brown, Ill. Fl. 2: *f.* 1915. PLATE 19, *f.* 1; dissection of flower, *f.* 2; pistil, *f.* 3; stamen, *f.* 4; fruiting hypanthium and calyx, *f.* 5.

Stems from a creeping caudex, about 2 dm. high, somewhat villous-puberulent,

branched, the branches generally erect. Stipules .5–1 cm. long, ovate, generally obtuse and subentire. Basal and lower cauline leaves digitate, of 5 leaflets, the upper ternate, all glabrous with ciliated margins and veins beneath, the basal ones with somewhat hairy petioles, which are 5–7 cm. long; leaflets obovate, deeply toothed toward the ends with rounded obtuse teeth. Pedicels erect. Hypanthium finely villous-hirsute, in fruit 5–7 mm. in diameter. Bractlets oblong, obtuse, much shorter than the broadly ovate acute sepals. Petals obovate, longer than the sepals.

This species comes very near the *Frigidae*, especially to *P. nana* and *P. Friesiana*. From the latter it differs little except in the number of leaflets. The leaves are much smaller than those of the other American *Aurææ*, the leaflets being only 10–20 mm. long. The sepals are broadly ovate, while in the rest they are ovate-lanceolate or lanceolate. *P. maculata* grows in arctic and alpine regions of Europe, in Greenland, the Baffin Bay region and Labrador. It has been regarded as a form of *P. rubens*, but is best regarded as a distinct species. The true *P. rubens* Vill., with thicker firmer larger and more rounded leaves, is probably not found on this side of the Atlantic, being apparently confined to the Alps. The specimens seen are:

Greenland: Rink; Hornemann; L. Krumlein, 1877–8; Warming & Holm, 1884; Wm. E. Meehan, No. 20, 1892; Rosenvinge, 1886.

Grinnell Land: A. W. Greely, No. 62.

Labrador: Anspach, 1873; "Fratres Moravi" (Ex Herb. John Ball); Weiz; L. M. Turner, No. 4837 and 4838, 1884. Dr. R. Bell, No. 1485, 1884 (Cape Chudleigh); A. C. Waghorne, No. 7308, 1892; No. 15, 1893; S. R. Butler, 1870; A. P. Low, No. 4994, 1892; Spreadborough, No. 16303 and 16318, 1896.

Hudson Bay Region: J. M. Macoun, No. 7307, 1887; Spreadborough, 1896.

35. *Potentilla dissecta* Pursh.

Potentilla dissecta Pursh, Fl. Am. Sept. 355. 1814.

Poir. in Lam. Enc. Meth. Suppl. 4: 543; Sprengel, Syst. Veg. 2: 536; Seringe in DC. Prod. 2: 575; Don, Gard. Diet. 2: 560; Dietr. Syn. Pl. 3: 180 and 190; Walp. Rep. 2: 35; Ann. 2: 472; Lehm. Stirp. Pug. 3: 20; Rev. Pot. 28.

Nutt. Gen. N. A. Pl. 1: 310; Eat. Man. Ed. 5: 344; Ed. 6: 280; Ed. 7: 457; Torr. & Gray, Fl. N. Am. 1: 446; Nutt. Journ. Acad. Phil. 7: 20; Eat. & Wr. N. Am. Bot. 373; Wats. Proc. Am. Acad. 8: 556¹; Porter & Coult. Syn. Fl. Colo. 37; Brewer & Wats. Bot. Cal. 1: 179; Rothrock, in Wheeler's Rep. 4: 113; Coulter, Man. Rocky

¹ Includes *P. Drummondii*, etc.

² This may refer to some other species, as the description reads "leaflets pinnatifid or coarsely serrate; tufted; hairy."

Mts. 85; Rattan, An. Key W. Coast. Bot. 51²; Greene, Fl. Fran. **1**: 64; Rose, Cont. U. S. Nat. Herb. **3**: 570; Rydberg, Bull. Torr. Bot. Club, **23**: 395.

Lehm. in Hook. Fl. Bor. Am. **1**: 193; Macoun, Cat. Can. Pl. 138 and 517.

Potentilla diversifolia Lehm. Stirp. Pug. **2**: 9. 1830.

Don, Gard. Diet. **2**: 556; Dietr. Syn. Pl. **3**: 185; Walp. Rep. **2**: 33; Ann. **2**: 482; Lehm. Rev. Pot. 72.

Eat. Man. Ed. **7**: 458; Torr. & Gray, Fl. N. Am. **1**: 439; Eat. & Wr. N. Am. Bot. 374; Torr. Frem. 1st Exp. 89 [174]; Wats. King's Rep. **5**: 86; Gray, Am. Journ. Sc. (II) **33**: 411 (Rep. 22).

Lehm. in Hook. Fl. Bor. Am. **1**: 190.

Potentilla campestris Nutt.; Torr. & Gray, Fl. N. A. **1**: 439. As synonym. 1840.

ILLUSTRATIONS: Lehm. Rev. Pot. *pl. 31*. PLATE 19, *f. 6*; dissection of flower, *f. 7*; stamen, *f. 8*; pistil, *f. 9*; fruiting hypanthium and calyx, *f. 10*.

Stem erect, few-leaved, smooth, 1–2 dm. high (in the variety of ten 3 dm.). Stipules lanceolate to ovate-acuminate. Basal leaves with petioles 5–15 cm. long, digitate, or often pinnate with approximate leaflets, slightly hairy, very rarely a little tomentose, in the variety generally perfectly smooth, veiny beneath. Stem leaves reduced, the uppermost 3-foliate and sessile; leaflets most commonly 7, oblanceolate or cuneate or sometimes obovate, more or less toothed with triangular teeth. Hypanthium more or less pubescent, in fruit 7–10 mm. in diameter. Bractlets and sepals lanceolate, acute, the former shorter. Petals obcordate or obovate and emarginate, about one-third longer than the sepals.

It would be much better if Lehmann's name were used for this species, as this, without doubt, belongs to it. Nobody seems to know absolutely what *P. dissecta* Pursh is. Dr. Watson thought it to be the same as *P. diversifolia* Lehm. Lehmann had seen *P. dissecta* in Bank's herbarium, but thought that his *P. diversifolia* was different. Not being able to settle the matter satisfactorily, the author thinks it best for the present not to make a change in the "accepted" nomenclature, although *P. diversifolia* is a good name and available, and besides has the advantage of belonging to this plant without doubt.

It seems to me as if the name *P. dissecta* belongs rather to *P. multisecta* (see below) or to *P. Ranunculus*. Lange's description and figure of the latter in Flora Danica, and the only specimen seen by me agree much better with Pursh's description of *P. dissecta* than the present species does.

Dr. Watson included in his *P. dissecta*, with varieties, not less than six different plants, which I believe are all good species, viz: *P. diversifolia* Lehm., *P. decurrens*

(Wats.), *P. multiseeta* (Wats.), *P. pinnatisecta* (Wats.) Aven Nelson, and *P. Drummondii* Lehm., and also *P. rubricaulis* Lehm., but I have not seen any authentic specimens of that species. There are three forms that fairly agree with Lehmann's description and figure of *P. rubricaulis*. One differs from *P. diversifolia* Lehm. only in being smaller and with leaves slightly whitened beneath. Following Gray and Watson, I took this to be *P. rubricaulis* Lehm. and made it a variety of the present species. I described it in the Bulletin of the Torrey Botanical Club, **23**: 396, under the name *P. dissecta rubricaulis*. It may be a hybrid between *P. dissecta* and *P. nivea* or *P. concinna*. It has been collected by Hall and Harbour in 1862 and H. Engelmann in 1856, in Colorado and Wyoming respectively. I have, however, since that time found specimens of another species, that agree more closely with Lehmann's description and figure, and regard that as the true *P. rubricaulis* Lehm.

P. dissecta varies much in the form of the leaves. In the type of *P. diversifolia* Lehm. the lower leaves were pinnate with approximate leaflets, but all the leaves are as often perfectly digitate. The leaflets are larger than in the other related species, oblanceolate, and generally seven in number. In the typical form they are generally appressed-hairy. All specimens seen are from the plain and mountain regions of the West, the range extending from Colorado to California, British Columbia and Saskatchewan.

Potentilla dissecta glaucophylla (Lehm.) Wats.

Potentilla glaucophylla Lehm. Del. Sem. Hort. Bot. Hamb. **1836**: 7.

Lehm. Linnaea, **7**: Litt. 83.

Potentilla diversifolia glaucophylla Lehm. Rev. Pot. 73. 1856.

Wats. King's Exp. **5**: 86; Walp. Ann. **2**: 483.

Potentilla dissecta glaucophylla Wats. Proc. Am. Acad. **8**: 556. 1873.

Porter & Coulter, Syn. Fl. Col. 37; Coulter, Man. Rocky Mts. 85, 1885; Macoun, Cat. Can. Pl. 517, 1886; Rydb. Bull. Torr. Bot. Club, **23**: 396.

Leaves nearly glabrous, glaucous-green and always digitate.

The range is the same as that of the species, but it is much more common within the United States.

36. Potentilla decurrens (Wats.) Rydb.

Potentilla dissecta var. *decurrens* Wats. Proc. Am. Acad. **8**: 557. 1873.

Coulter, Man. Rocky Mts. 85. 1885.

Potentilla decurrens Rydberg, Bull. Torr. Bot. Club, **23**: 396. 1896.

ILLUSTRATIONS: PLATE 20, *f. 1*; dissection of flower, *f. 2*; pistil, *f. 3*; stamens *f. 4*; fruiting hypanthium and calyx, *f. 5*.

Low and subcespitose; stems less than 1 dm. high, when young slightly villous, glabrate in age. Stipules ovate, acute. Basal leaves pinnately rather than palmately 5-foliolate, thick and somewhat coriaceous, with ribs prominent beneath; leaflets obovate in outline, the two lower much smaller, all deeply cleft into oblong divisions and more or less decurrent, especially in the type specimens. Hypanthium silky-villous, in fruit about 5 mm. in diameter. Bractlets oblong, obtuse, much shorter than the ovate-lanceolate acute sepals. Petals obovate, much longer than the sepals.

This species much resembles the preceding, especially the var. *glaucophylla*, but it is a more cespitose plant and has smaller and thicker leaves with prominent veins beneath. The leaflets are generally five and the lower often attached a little lower down and decurrent on the petiole, but this is not always the case by far. It is found in the higher mountains of Utah, Wyoming, Montana and British America.

Utah: S. Watson (King's Exped.) No. 329. 1869 (type).

Wyoming: J. N. Rose, Nos. 645 and 256. 1893.

Montana: Rydberg and J. H. Flodman, Nos. 575, 571 and 572. 1896.

British Columbia (?): Macoun, No. 7246, 1891, in part; Nos. 16726 and 16727.

Alberta: John Macoun, 1897.

37. *Potentilla Ranunculus* Lange.

Potentilla Ranunculus Lange, Fl. Dan. *pl.* 2964.

Lange, Consp. Fl. Groenl. 7; Rosenvinge l. c. 655; Rydb. Bull. Torr. Bot. Club, **23**: 396.

ILLUSTRATIONS: Fl. Dan. *pl.* 2964.

Cespitose, rootstock thick, long and thickly covered by brown scale-like remnants of stipules and petioles. Stems ascending, 1-3 dm. high, glabrate or slightly pubescent, 2-4-flowered and few-leaved. Basal leaves digitately 5-foliolate, thin, not strongly veined, glaucous, glabrous or ciliate; leaflets obovate, deeply 5-7-cleft into large lanceolate obtuse teeth; stem leaves ternate. Petals slightly emarginate, slightly longer than the sepals, pale yellow.

Greenland: A. Hartz, No. 8024. 1890.

38. *Potentilla multisecta* (Wats.) Rydb.

Potentilla diversifolia var. *multisecta* Wats. King's Rep. **5**: 86. 1871.

Coulter, U. S. Geol. Surv. **1872**: 765. 1872.

Potentilla dissecta var. *multisecta* Wats. Proc. Am. Acad. **8**: 557. 1873.

Macoun, Cat. Can. Pl. 517, 1886; Coult. Man. Rocky Mts. 85.

Potentilla multisecta Rydb. Bull. Torr. Bot. Club, **23**: 397. 1896.

ILLUSTRATIONS: PLATE 20, *f. 6*; dissection of flower, *f. 7*; stamen, *f. 8*; pistil, *f. 9*; fruiting hypanthium and calyx, *f. 10*.

Stem erect, slender, 1–2 dm. high, more or less silky-strigose. Stipules ovate-lanceolate, acute, about 5 mm. long. Basal leaves with petioles 5–10 cm. long, more or less silky, digitate or pinnate with approximate leaflets; leaflets 3–7, the lower smaller, all dissected into linear or linear-oblong divisions. Stem leaves much reduced and few. Hypanthium silky, in fruit 5–7 mm. in diameter; bractlets and sepals oblong-lanceolate, acute, nearly equal. Petals obcordate, about one-half longer than the sepals.

This was also included in *P. dissecta* by Watson. It is probable that this plant is the original *P. dissecta* Pursh, the description of which fits it, as well as *P. Ranunculus* Lange, better than the species for which the name is used, viz. *P. diversifolia* Lehm. From this, *P. multisecta* differs not only in the finely dissected leaves, but also in the smaller flowers. The leaves are not truly digitate, but the outer leaflets are attached a little lower, as in *P. decurrens*; all are divided into linear segments. This species therefore connects the *Aurææ* with the *Multijugæ*, especially with *P. pinnatisecta* and *P. millefolia*. It ranges from Nevada to British Columbia and Wyoming.

Nevada: S. Watson (King's Exp.), No. 330, 1868 (type); M. E. Jones, 1891.

Wyoming: F. H. Burglehaus, 1893.

Montana: F. W. Anderson, No. 125, 1885; Rydberg, No. 2691, 1895.

British Columbia: Macoun, No. 7245, 1890 and 7246 (in part), 1891.

§ 9. GRACILES.

39. *Potentilla subcoriacea*.

Stem from a thick perennial root, 3–5 dm. high, strigose and more or less glandular upward. Leaves dark green and shining, nearly glabrous, thick and somewhat coriaceous, digitate, with 5–7 broadly obovate cuneate leaflets 3–5 cm. long. Bractlets lanceolate, shorter than the sepals. Petals yellow, broadly obcordate, one-half longer than the sepals.

This species most resembles *P. ranunculoides* Humb. & Bonpl., from which it differs mainly in the size of the plant, the thicker and larger leaves and the glandular pubescence on the upper part of the stem.

Mexico: C. G. Pringle, No. 5258, 1892.

40. *Potentilla etomentosa* Rydb.

Potentilla rigida Newberry, Pac. R. R. Rep. **6**: Part 3, 72. 1857. Not Wall. 1828.

Potentilla gracilis rigida Coville, Cont. U. S. Nat. Herb. 4: 96. 1893.

Potentilla tomentosa Rydb. Bull. Torr. Bot. Club, 24: 8. 1897.

(?) *Potentilla olopetala* Lehm. Rev. Pot. 78. In part. 1856.

Stem 4–5 dm. high, slightly hairy, erect, from a stout caudex. Stipules ovate to lanceolate, entire; leaves with long petioles, digitate, of about 7 leaflets, glabrate above, slightly silky-strigose beneath but without any trace of tomentum; leaflets obovate, 3–5 cm. long, crenate or serrate with ovate teeth. Hypanthium hirsute; bractlets oblong, a little shorter than the ovate pointed sepals. Petals obcordate, scarcely exceeding the sepals.

This most resembles *P. pulcherrima*, but is perfectly without tomentum and only slightly hairy. It resembles *P. Nuttallii* only in the lack of tomentum. It has the crenate obovate leaves of *P. pulcherrima*, and if not held distinct must be regarded as a variety of that species. The distribution is quite different, *P. pulcherrima* not having been collected in California. The following are the specimens seen:

California: Fremont, No. 162, 1846 (type); J. S. Newberry (Williamson Expedition); Munson & Hopkins, 1889; Coville & Funston, No. 1399, 1891; J. G. Lemmon, No. 84.

Wyoming: Stevenson, Nos. 64 and 71, 1894; F. H. Knowlton, 1887.

41. *Potentilla heptaphylla* Mill.

Potentilla heptaphylla Mill. Gard. Diet. Ed. 8: No. 7. 1768.

Ser. in DC. Prod. 2: 586; Lehm. in Mert. & Koch, Fl. Deutsch. 528; Ind. Sem. Hort. Hamb. 1831.* Rev. Pot. 76.

Wats. Proc. Am. Acad. 17: 353.

Potentilla intermedia Nest. Mon. 49. 1816. Not L.

Lehm. Mon. 100; Ser. in DC. Prod. 2: 577; Spreng. Syst. Veg. 2: 536.

Potentilla Nestleriana Tratt. Ros. Mon. 4: No. 91.*

Potentilla Halleriana Tratt. Ros. Mon. 4: No. 86.*

Potentilla alchemilloides Schlecht. Mag. Ges. Naturf. Fr. Berlin, 7: 291 (in part).* Not Lapeyr.¹

ILLUSTRATIONS: Nestler, Monog. pl. 8.

Stem slender, 3–4 dm. high, sparingly silky, 1–2-leaved. Basal leaves with long slender petioles, digitately 5-foliolate, silky-ciliate or glabrate; leaflets 3–5 cm. long, obcordate, thin, coarsely serrate. Cyme narrow, almost racemose. Bractlets lanceolate, two-thirds the length of the lanceolate sepals. Petals yellow, obcordate, nearly twice as long as the sepals.

The Mexican specimens seem to have a somewhat narrower cyme than the European but differ in no other respect, as far as I can determine.

Mexico, State of Coahuila: Dr. E. Palmer, No. 327, 1880.

¹Several less important synonyms are omitted.

42. *Potentilla fastigiata* Nutt.

Potentilla fastigiata Nutt.; Torr. & Gray, Fl. N. Am. 1: 440. 1840.

Dietr. Syn. Pl. 3: 182; Walp. Rep. 2: 33.

Gray. Pl. Fendl. in Mem. Amer. Acad. 4: 42; Proc. Am. Acad. 1863: 61; Porter, U. S. Geol. Surv. 1870: 475; Rydb. Bull. Torr. Bot. Club, 24: 7.

Potentilla holopetala fastigiata Lehm. Stirp. Pug. 9: 46. 1851.

Walp. Ann. 2: 485; Lehm. Rev. Pot. 79.

Potentilla gracilis fastigiata Wats. Proc. Am. Acad. 8: 557. 1873.

Brewer & Wats. Bot. Cal. 1: 179; Coult. Man. Bot. Rocky Mts. 85.

ILLUSTRATIONS: PLATE 21, f. 1.

Stem low, 2–3 dm. high, ascending, generally quite densely silky-villous, rather simple. Stipules ovate-lanceolate, often toothed, .5–1 cm. long. Leaves on rather short petioles, digitate, of 5–7 leaflets, generally rather long silky-villous on both sides and slightly tomentose beneath. Leaflets obovate, 1–3 cm. long, coarsely crenate or somewhat incised with broad teeth. Cyme generally rather dense. Hypanthium silky-villous, in fruit about 8 mm. in diameter. Bractlets oblong, shorter than the triangular acute sepals. Corolla 10–15 mm. in diameter. Petals broadly obovate, a little exceeding the sepals.

This perhaps comes nearest to *P. pulcherrima*, resembling it in the form of the leaflets and the size of the flower, but it is a smaller plant, less than 3 dm. high and with a rather crowded cyme. The pubescence of the leaves is also different, long, silky and with very little tomentum beneath. It is a rather rare plant, extending from Wyoming and California to Saskatchewan.

Wyoming: A. Nelson, No. 931, 1894.

Idaho: Sandberg, 1881 and 1887.

Assiniboia: J. Macoun, No. 4539, 1894.

Nevada: J. Torrey, No. 121, 1865.

Yellowstone National Park: T. H. Burglehaus, 1893.

California: Geo. Hanson, No. 297, 1892.

Washington: W. N. Suksdorf, No. 2488, 1884.

Rocky Mts.: Nuttall (type).

43. *Potentilla pulcherrima* Lehm.

Potentilla pulcherrima Lehm. Stirp. Pug. 2: 10. 1830.

Don, Gard. Diet. 2: 556; Walp. Ann. 2: 482; Lehm. Rev. Pot. 69.

Eat. Man. Ed. 7: 459; Eat. & Wr. N. Am. Bot. 374; Wats. in King's Rep. 5: 87;

Porter, U. S. Geol. Surv. **1871**: 482; Coulter, *ibid.* **1872**: 756 and 765; Rydb. Bull. Torr. Bot. Club, **24**: 5; Hook. Fl. Bor. Am. **1**: 190.

? *Potentilla Pennsylvanica* var. *pulcherrima* Torr. & Gray, Fl. N. A. **1**: 438. 1840.

Potentilla gracilis Porter & Coult. Fl. Col. **37**; Coult. Man. Rocky Mts. 85. In part. Eastwood, Fl. Denver, 16; Aven Nelson, Wy. Exp. Sta. Bull. **28**: 102, in part;

Rydberg, Contr. U. S. Nat. Herb. **3**: 497.

Macoun, Cat. Can. Pl. 138 and 517. In part.

Potentilla Hippiana pulcherrima Wats. Proc. Am. Acad. **8**: 555. In part. 1873.

Coult. Man. Bot. Rocky Mts. 84. In part.

Macoun, Cat. Can. Pl. 137. In part. 1888.

ILLUSTRATIONS: Lehm. Rev. Pot. *pl.* 22. PLATE 22, *f.* 1; dissection of flower, *f.* 2; pistil, *f.* 3; stamen, *f.* 4; fruiting hypanthium and calyx, *f.* 5.

Stem slender, 3–6 dm. high, sparingly silky, branched above. Stipules lanceolate to broadly ovate, acute, subentire, or sinuately toothed. Basal leaves in the original form pinnate with approximate leaflets, but more commonly digitate with about 5 leaflets, silky and green above, generally densely white-tomentose beneath; leaflets oblong, oblanceolate or narrowly obovate, crenate. Stem leaves smaller and short-petioled. Hypanthium silky, in fruit 5–8 mm. in diameter; bractlets oblong-lanceolate, acute, shorter than the ovate-lanceolate sepals, which are acuminate into a nearly subulate tip. Corolla 12–15 mm. in diameter; petals obovate, cuneate, emarginate, about the length of the sepals.

As originally described, *P. pulcherrima* Lehm. has pinnate leaves with approximate leaflets. This was undoubtedly the reason why Watson united it with *P. diffusa* Gray. As far as I know, that plant is low, ascending, and rather silky and in all respects nearest related to *P. Hippiana* (see below), while *P. pulcherrima* is tall, upright, with slender erect branches and nearest related to *P. gracilis* and *P. fastigiata*. Watson, during King's Expedition, observed the fact that *P. pulcherrima* had not always pinnate leaves, which, in fact, is rather seldom the case, and consequently included in *P. Hippiana pulcherrima* also a form with digitate leaves. The only character left to distinguish forms of *P. Hippiana* from those of *P. gracilis* was the number of carpels, in the former 10–15, in the latter 40. Unfortunately the number varies even in the same individual, and therefore many specimens determined as *P. gracilis* belong to *P. pulcherrima*. My own from the Black Hills, I unfortunately so labeled. *P. pulcherrima* differs from the other members of the group by its leaflets, which are obovate or oblanceolate, mostly obtuse, crenate, silky and green above, densely white-tomentose beneath. It grows in the mountains and foothills from New Mexico and Nevada to Saskatchewan. No specimens have been seen from the Pacific slope.

44. *Potentilla staminea*.

Stem stout, 4–6 dm. high, leafy, more or less villous-tomentose. Basal leaves with densely woolly petioles about 1 dm. long, digitate with 7 leaflets, hairy but green above, densely white-tomentose and silky beneath; leaflets obovate, 4–10 cm. long, coarsely crenate-serrate. Stem-leaves 3–5-foliate, short-petioled or sessile. Cyme open with long pedicels. Hypanthium villous; bractlets oblong or lanceolate, about half as long as the ovate-acuminate sepals. Corolla 2.5–3 cm. in diameter; petals yellow, broadly obcordate, nearly twice as long as the sepals. Stamens about 40; styles filiform.

This resembles most *P. leptopetala*, differing, however, in the greater size of the plant as well as of the flower, in the greater number of stamens and in the 7-foliate basal leaves.

Southern Mexico: Dr. Ghiesbrecht, Nos. 131 and 681, 1864–70.

45. *Potentilla leptopetala* Lehm.

Potentilla leptopetala Lehm. Ind. Sem. Hort. Bot. Hamb. **1830**: 8. 1830.

Lehm. Stirp. Pug. **3**: 32; Linnaea, **13**: 264; Regensb. Bot. Zeitg. **1**: 133, 1831*; Rev. Pot. 113; Don, Gard. Diet. **2**: 554; Dietr. Syn. Pl. **3**: 183; Walp. Rep. **2**: 28; Ann. **2**: 498; Hemsley, Biol. Cent. Am. **1**: 376.

Potentilla hiemalis Schlecht. Linnaea, **5**: 572, 1830; Don, Gard. Diet. **2**: 553.

Potentilla frigida Schiede & Depp.; Lehm. Rev. Pot. 113. 1856.

ILLUSTRATIONS: Lehm. Rev. Pot. *pl.* 43.

Stem ascending, 1–2-leaved, covered with long grayish reflexed hairs; basal leaves digitately 5-foliate, pilose or glabrate and green above, white-tomentose and long silky beneath; leaflets ovate, strongly nerved, serrate; bractlets lanceolate, much shorter than the ovate sepals. Petals obcordate, scarcely equalling the sepals.

In high altitudes of Central Mexico: Crus Blanca and San Salvador,* Schiede; Mineral del Monte,* C. Ehrenberg.

46. *Potentilla candida* Rydberg.

Potentilla gracilis var. Wats. King. Exp. **5**: 88. 1872.

Potentilla candida Rydberg, Bull. Torr. Bot. Club, **24**: 6. 1897.

ILLUSTRATIONS: Bull. Torr. Bot. Club, **24**: *pl.* 287. PLATE 23, *f.* 1; dissection of flower, *f.* 2; stamen, *f.* 3; pistil, *f.* 4; fruiting hypanthium and calyx, *f.* 5.

Stem low, 1–2 dm. high, densely white silky-strigose; stipules ovate, entire, nearly 1 cm. long; leaves on rather short petioles, densely silvery-silky on both sides, digitate; leaflets 7–9, obovate in outline, 2–4 cm. long, rather thick, deeply incised or cleft into large oblong teeth; cyme rather dense; flowers about 1 cm. in diameter; hypanthium white-silky; bractlets lanceolate, much shorter than the ovate sepals; petals yellow, obcordate, a little exceeding the sepals.

It most resembles a depauperate *P. Blaschkeana*, and differs mainly in the pubescence which is very dense on both sides of the leaves and silky; tomentum none.

Nevada: S. Watson, No. 337, 1868 (type).

Montana: F. V. Hayden, 1860; Rydberg, No. 2687, 1895.

Wyoming: T. C. Porter, 1873.

47. *Potentilla gracilis* Dougl.

Potentilla gracilis Dougl.; Hook. Bot. Mag. *pl.* 2984. 1829.

Don, Gard. Dict. **2**: 554; Dietr. Syn. Pl. **3**: 182; Walp. Rep. **2**: 33; Ann. **2**: 493; Lehm. Rev. Pot. 107.

Torr. & Gray, Fl. N. Am. **1**: 440; Eat. Man. Ed. 7: 457; Eat. & Wr. N. Am. Bot. 373; Torr. Bot. U. S. Expl. Exp. 239; Rothrock, U. S. Geol. Surv. **4**: 113; Wats. Proc. Am. Acad. **8**: 557 (in part); Brewer & Wats. Bot. Cal. **1**: 179 (in part); Gray, Proc. Am. Acad. **8**: 381; Coop. Pac. R. R. Rep. **12**: Book 2, Part 2: 48 (?); Rydb. Bull. Torr. Bot. Club, **24**: 5.

Hook. Fl. Bor. Am. **1**: 192; Macoun, Cat. Can. Pl. 138 and 517 (in part).

ILLUSTRATIONS: Bot. Mag. *pl.* 2984. PLATE 24, *f.* 1, 2, dissection of flower, *f.* 3; stamen, *f.* 4; pistil, *f.* 5; fruiting hypanthium and calyx, *f.* 6.

Stem 4-7 dm. high, slender, slightly silky-villous, with erect or ascending branches; stipules lanceolate, 1-3 cm. long, entire, or with 1-2 teeth. Basal leaves with slender petioles 1-1.5 dm. long, digitate with 5-7 leaflets, green and nearly glabrous above, densely and finely white-tomentose beneath; leaflets 3-6 cm. long, oblanceolate, divided about half-way to the midrib into lanceolate triangular coarse teeth. Stem leaves similar but with shorter petioles. Cyme rather narrow. Hypanthium long-silky, in fruit 8-10 mm. in diameter. Corolla 15-20 mm. in diameter; petals obcordate, deeply emarginate, much exceeding the sepals. Bractlets lanceolate, a little shorter than the ovate acuminate sepals.

The true *P. gracilis* is a very rare plant and is confined to the northern Pacific Coast. What has gone under this name is either *P. pulcherrima* or the next following species. It differs from both in the narrow leaflets, which are oblanceolate, acute and coarsely toothed with triangular teeth of the same form as in *P. recta*. The leaves are only slightly silky above and finely tomentose beneath, and the branches of the cyme are very slender and erect. The following specimens have been examined:

Oregon: Scouler; Douglas; Nuttall; Tolmie, 1851; E. Hall, No. 136, 1871; T. Howell, 1882; W. H. Suksdorf, Nos. 325 and 2491, 1896.

Washington: Dr. Ruhn; Wilke's Expedition, No. 141; G. H. Hicks, No. 216, 1890; W. G. Edwards, 1896; T. Kincaid.

Vancouver Island: John Macoun, 1887; No. 182, 1893.

Kodiak Island: (Collector not given).

48. *Potentilla Blaschkeana* Turez.

Potentilla Blaschkeana Turez; Lehm. in Otto, Gart. u. Blumenz. **9**: 506. 1853.

Lehm. Ind. Sem. Hort. Hamb. **1853**: 9; Rev. Pot. 107; Rydb. Bull. Torr. Bot. Club, **24**: 6.

Potentilla gracilis Wats. King's Rep. 5: 88. 1871. Not Dougl. 1829.

Wats. Proc. Am. Acad. **8**: 557 (in part); Brewer & Wats. Bot. Cal. **1**: 179 (mainly); Rothrock, U. S. Geol. Surv. **4**: 113; Coult. Man. Rocky Mts. 85 (in part); U. S. Geol. Surv. **1872**: 765; Tweedy, Fl. Yell. Nat. Park, 35; Rattan, An. Key W. Coast Bot. 51; Greene, Fl. Fran. **1**: 64; Aven Nelson, Wy. Exp. Sta. Bull. **28**: 102, in part; K. Brandegee, Zoe, **2**: 162.

Macoun, Cat. Can. Pl. 138 and 517. In part.

Potentilla gracilis flabelliformis Newberry, Pac. R. R. Rep. **6**: Part 3, 72. 1857.

ILLUSTRATIONS: Lehm. Rev. Pot. *pl. 64*. PLATE 25, *f. 1*; dissection of flower, *f. 2*; pistil, *f. 3*; stamen, *f. 4*; fruiting hypanthium and calyx, *f. 5*.

Stem stout, 5–8 dm. high, sparingly silky, branched above. Stipules large, 1–2 cm. long, lanceolate or ovate-lanceolate, acute, the upper often coarsely toothed. Basal leaves digitate, of about 7 leaflets, silky, or nearly smooth and green above, white-tomentose beneath, with petioles 5–15 cm. long; leaflets about .5 cm. long, obovate in outline, deeply toothed or cleft into ovate or oblong teeth, often divergent. Stem leaves similar but smaller and short-petioled. Cyme many-flowered and open. Hypanthium silky, in fruit often over 1 cm. in diameter; bractlets oblong-lanceolate, often much shorter than the broadly lanceolate long-acuminate sepals. Corolla 15–20 mm. in diameter; petals broadly obovate, deeply notched at the apex, much longer than the sepals.

This differs from *P. gracilis* in stouter habit, ascending branches, larger flowers and broader leaflets, which are obovate, deeply toothed or cleft into ovate or oblong teeth, silky and green above, silky and tomentose beneath. It must be admitted that this species is near to the preceding; it was merged therein by Watson, but it is evidently not as near *P. gracilis* as is *P. pulcherrima*, which differs only in the form of the teeth.

P. Blaschkeana is common from California to Wyoming and northward as far as Kodiak, off Alaska.

49. *Potentilla viridescens*.

Stem 5–7 dm. high, sparingly silky with appressed or slightly spreading hairs, branched above, with long spreading branches. Basal leaves several, with petioles 1–2 dm.

long, digitate, with about 7 leaflets, silky, but green above, silky and somewhat tomentulose but not white beneath; leaflets oblanceolate or spatulate, deeply toothed or divided nearly half way to the midrib, with oblong, often somewhat divergent teeth. Stem leaves smaller, with short petioles. Cyme many-flowered, loose and open. Hypanthium silky, in fruit about 1 cm. in diameter; bractlets lanceolate, a little shorter than the ovate-lanceolate sepals, both acuminate. Corolla 10–15 mm. in diameter, yellow; petals obcordate, equalling or slightly exceeding the sepals.

This species is intermediate between *P. fastigiata*, *Blaschkeana* and *Nuttallii*. In the form of the leaflets and their dentation it resembles the latter two; in the pubescence, it is most like the first. It differs from *P. Blaschkeana* in the smaller flowers, the longer, more slender, and more open branches of the cyme, and in the much less dense tomentum on the lower surface of the leaves. In the first two characters, it agrees with *P. Nuttallii*, from which it is distinguished by the presence of tomentum, which is, however, very sparse, by the more silky pubescence, and by the less prominent venation of the leaves. From *P. fastigiata* it is separated by the tallness of the plant, the open and slender branched cyme, and the deeper toothing of the leaves. It is most common in the Saskatchewan region, but extends to Colorado, Wyoming and British Columbia.

The figure given for *P. Nuttallii* would serve as an illustration of this species, as the main difference lies in the pubescence.

Manitoba: John Macoun, No. 14447, 1896.

Assiniboia: John Macoun, No. 14448, 1876; Nos. 14442, 14443, 14445, 14449, 14450, 1896.

Alberta: John Macoun, Nos. 16723, 16745, 16746, 16748, 1897.

Montana: J. H. Flodman, No. 566, 1896.

Washington: Sandberg & Leiber, 1893; C. V. Piper, No. 2736, 1897.

Wyoming: Aven Nelson, No. 1858, 1895.

Colorado: C. F. Baker, No. 16, 1896.

50. *Potentilla Nuttallii* Lehm.

Potentilla Nuttallii Lehm. Ind. Sem. Hort. Bot. Hamb. **1852**: 12. 1852.

Lehm. Ann. Sc. Nat. (III) **19**: 364; Rev. Pot. 89; Otto, Garten. u. Blumenz. **8**: 373*; Walp. Ann. **2**: 483.

Wats. King's Rep. **5**: 88; Porter, U. S. Geol. Surv. **1871**: 482; Coulter, *ibid.* **1872**: 756; Greene, Fl. Fran. **1**: 64; Rydb. Bull. Torr. Bot. Club, **24**: 8.

Potentilla recta Nutt. Gen. **1**: 310. 1818. Not L. 1753.

Potentilla rigida Nutt. Journ. Acad. Phil. **7**: 20. 1834. Not Wall. 1828.

Torr. & Gray, Fl. N. Am. **1**: 440; Walp. Rep. **2**: 33.

Potentilla chrysantha Lehm. in Hook. Fl. Bor. Am. **1**: 193. 1833. Not Trev. 1818.

Potentilla gracilis Torr. in Frem. 1st Exp. 89. 1845. Not Dougl. 1829.

Holz. Cont. U. S. Nat. Herb. **3**: 223. In part. 1896.

Potentilla gracilis var. *rigida* Wats. Proc. Am. Acad. **8**: 557. 1873.

Porter & Coult. Syn. Fl. Col. **37**; Brewer & Wats. Bot. Cal. **1**: 179; Rothrock, U. S. Geol. Surv. **4**: 113; Coulter, Man. Rocky Mts. 85; Rattan, An. Key W. Coast Bot. 51. Macoun, Cat. Can. Pl. 138.

Potentilla gracilis chrysantha Rydb. Fl. Neb. **21**: 16. 1895.

ILLUSTRATIONS: Lehm. Rev. Pot. *pl. 33*. PLATE 26, *f. 1*; dissection of flower, *f. 2*; stamen, *f. 2*; pistil, *f. 3*; fruiting hypanthium and calyx, *f. 5*.

Stem 6–8 dm. high, stout, sparingly hirsute, branched above, with long branches. Stipules lanceolate, acute, subentire. Basal leaves many, digitate, of about 7 leaflets, prominently veiny and sparingly hirsute, not at all tomentose beneath, green, with petioles 1–3 dm. long; leaflets 5–10 cm. long, oblanceolate, toothed or divided nearly half-way to the midrib, with large triangular divergent acute teeth. Stem leaves smaller and short-petioled. Cyme many-flowered, loose and open. Hypanthium hirsute, in fruit about 1 cm. in diameter; bractlets linear to lanceolate, generally shorter than the ovate-lanceolate long-acuminate sepals. Corolla 10–15 mm., yellow; petals obovate, emarginate, about the length of the calyx.

The general habit of this species resembles that of *P. Blaschkeana*, but the flowers are smaller and the plant is green, without tomentum and coarsely hirsute. The distribution is from Colorado to California, British Columbia and Saskatchewan.

***Potentilla Nuttallii glabrata* Lehm.**

Potentilla Nuttallii glabrata Lehm. Rev. Pot. 89. 1868.

More slender, more glabrous, the leaves with deeper and narrower lobes.

Fremont, 1842.

Oregon: Burke; C. V. Piper, No. 2468, 1896.

51. *Potentilla recta* L.

Potentilla recta L. Sp. Pl. 497. 1753.

Potentilla corymbosa Moench, Suppl. 279. 1802.*

Potentilla obscura Willd. Sp. Pl. **2**: 1100; Nestler, Mon. 44; Lehm. Mon. 82; Rev. Pot. 82; Spreng. Syst. Veg. **2**: 536.

Potentilla hirta obscura DC. Prod. **2**: 578. 1825.

Potentilla recta obscura Koch, Syn. Fl. Germ. & Helv. 213.¹

Tall and strict, generally over 5 dm. high, sparingly hirsute, the long hairs often intermixed with a finer pubescence. Leaves dark green, very strongly veined, digitate, with 5-8 broadly oblanceolate leaflets, which are cut more than half-way to the midrib into lanceolate-triangular divergent teeth. Cyme branched, many-flowered. Sepals and bractlets subequal, lanceolate, almost equalling the bright and rather dark yellow petals. Stamens about 30. Pistils numerous.

The true *P. recta* is very rare in America, and I doubt if it ever has established itself. A few specimens are found in our herbaria, but they are almost all from cultivated specimens. One of these was from seeds collected by J. Blake, at York, Maine. What has gone under the name *P. recta* in this country is mostly the next species.

52. *Potentilla sulphurea* Lam.

Potentilla sulphurea Lam. Fl. Fr. 3: 114. 1778.

Potentilla pallens Moench, Meth. 658. 1794.

Potentilla recta Willd. Sp. Pl. 2: 1099. 1800. Not L. 1753.

Persoon, Syn. Pl. 2: 54; Nestler, Mon. Pot. 25 and 42; Haller, Syn. Pot. 55; Lehm. Mon. Pot. 79; Sprengel, Syst. Veg. 2: 536; Don, Gard. Diet. 2: 555; Dietr. Syn. Pl. 3: 184; Ledeb. Fl. Ross. 2: 45.

Eat. Man. Ed. 2: 379; Ed. 3: 408; Ed. 5: 344; Ed. 6: 281; Ed. 7: 457; Eat. & Wr. N. Am. Bot. 373; Wood, Class Book, 343; A. Brown, in Bull. Torr. Bot. Club, 7: 124; Wibbe, *ibid.* 10: 47; Hill, *ibid.* 21: 79; Wats. & Coult. in Gray, Man. Ed. 6: 735^a; Bailey, in Gray, F. F. & G. Bot. Rev. Ed. 151; Rydb. Bull. Torr. Bot. Club, 24: 9; Britt. & Brown, Ill. Fl. 2: 210.

Potentilla recta sulphurea La Peyr. Hist. Abr. Pl. Pyr. 288. 1813.

Potentilla pallida Lagase.; Besser, Enum. Pl. Volh. 69. 1822.

Potentilla hirta recta Ser. in DC. Prod. 2: 579. 1825.

Potentilla crassa Tausch.; Opiz, Boeheim's Gev. 63 (fide Lehmann).

Potentilla intermedia Roth, Tent. Fl. Germ. 1: 223 (fide Lehmann). Not L.

Potentilla acutifolia Gilib. Suppl. Plant. Eur. 364 (fide Lehm.).

Potentilla erecta Lehm. Mon. 23, 1820 (misprint?); Upenski; Ledeb. Fl. Ross. 2: 45.

Potentilla recta pallida Lehm. Rev. Pot. 83. 1856. Walp. Ann. 2: 486.

ILLUSTRATIONS: Dietr. Fl. Boruss. 4: *pl.* 238*; Nestler. Mon. *pl.* 6; Sturm, Deutschl. Fl. 91: *pl.* 4*; Reichenb. Icon. Bot. Cent. 4: *pl.* 339, *f.* 520*; Britt. & Brown, Ill. Fl. 2: *f.* 1917. PLATE 27, *f.* 1; dissection of flower, *f.* 2; pistil, *f.* 3; stamen, *f.* 4; fruiting hypanthium and calyx, *f.* 5.

Stems tall, 4-7 dm. high, strict and leafy, branched above, finely pubescent and with

¹ Most references are here omitted.

scattered long hairs, pale green. Stipules ovate in outline, 1–1.5 cm. long, generally pectinately toothed. Lower leaves digitate, of about 7 leaflets, with petioles about 1 dm. long, sparingly pubescent and hirsute on both sides, pale green, strongly veined, the upper 5-foliolate and short-petioled and the uppermost ternate and sessile; leaflets narrowly oblanceolate, deeply toothed, with triangular acute divergent teeth. Hypanthium hirsute, in fruit 12–15 cm. in diameter; bractlets oblong-lanceolate, about equalling the triangular-lanceolate acute sepals. Corolla about 20 mm. in diameter; petals obovate, deeply emarginate, sulphur yellow, about half exceeding the sepals.

This sometimes resembles *P. Nuttallii* in pubescence and general habit, but differs in being paler and in its large pale yellow petals. It is of European origin and occurs sparingly from the Eastern States to the District of Columbia and to Ohio.

The following specimens have been examined:

New York: W. W. Rowlee, 1892; C. S. Sheldon, 1880; Jos Schrenk, 1877; Curtice & Kilborne, No. 41, 1879; J. H. Wibbe.

New Jersey: S. W. Knipe.

District of Columbia: W. H. Seaman, 1875.

Ohio: Wm. C. Werner, No. 21, 1890.

Michigan: W. J. Beal, No. 2055, 1890.

Vermont: H. E. Sargent.

Ontario: Macoun, No. 74, 1882.

53. *Potentilla pectinisecta* Rydb.

Potentilla pectinisecta Rydberg, Bull. Torr. Bot. Club, **24**: 7. 1897.

ILLUSTRATIONS: PLATE 21, *f.* 2–6; lower part of stem, *f.* 2; dissection of flower, *f.* 3; stamen, *f.* 4; pistil, *f.* 5; fruiting hypanthium and calyx, *f.* 6.

Stem slender, 3–4 dm. high, ascending, finely strigose or hirsute. Stipules ovate, often toothed. Leaves slender-petioled, digitate, of 5–8 leaflets, appressed-silky on both sides and sometimes slightly tomentulose beneath; leaflets obovate, deeply pectinately divided into oblong or linear segments. Cyme rather dense; hypanthium appressed-silky; bractlets linear-lanceolate, shorter than the broadly lanceolate sepals. Petals yellow, obcordate, scarcely exceeding the sepals.

It has gone under the names of *P. gracilis flabelliformis* and *fastigiata*. It resembles *P. fastigiata* in general habit and pubescence, but is more slender. The form of the leaflets is most like that of *P. Blaschkeana* and *P. Nuttallii*, and sometimes that of *P. flabelliformis*, but the plant is more delicate and the pubescence is silky and rather scant.

Specimens examined:

Arizona: E. Palmer, No. 145, 1877.

Wyoming: C. E. Sheldon, No. 72, 1884; Fremont, 2d Exp.

Montana: Robert Adams, 1871; Rydberg and Bessey, No. 4379, 1897.

Utah: L. F. Ward, No. 119, 1875; M. E. Jones, No. 5554d and 35544, 1894; No. 1765, 1880; Mrs. Thompson, No. 195, 1873.

54. *Potentilla flabelliformis* Lehm.

Potentilla flabelliformis Lehm. Stirp. Pug. **2**: 12. 1830.

Don, Gard. Dict. **2**: 554; Walp. Ann. **2**: 493; Lehm. Mon. Pot. Suppl. 13; Rev. Pot. 108.

Eat. Man. Ed. 7: 457; Eat. & Wr. N. Am. Bot. 373; Rydb. Bull. Torr. Bot. Club, **24**: 6.

Lehm. in Hook. Fl. Bor. Am. **1**: 192; Hook. Journ. Bot. **6**: 220.

Potentilla gracilis flabelliformis Nutt.; Torr. & Gray, Fl. N. Am. **1**: 440. 1840.

Dietr. Syn. Pl. **3**: 182; Walp. Rep. **2**: 33.

Cooper, Pac. R. R. Rep. **12**: Book 2, Part 2, 55; Torr. Bot. U. S. Expl. Exp. 289; Wats. King's Rep. **5**: 88; Porter, U. S. Geol. Surv. **1871**: 482; Coulter, *ibid.* **1872**: 765; Proc. Am. Acad. **8**: 557; Bot. Cal. **1**: 179; Coulter, Man. Rocky Mts. 85; Tweedy, Fl. Yell. Nat. Park, 35; Aven Nelson, Wy. Exp. Sta. Bull. 28: 103; Macoun, Cat. Can. Pl. 138.

Potentilla flabelliformis tenuior Lehm. Rev. Pot. 108. 1856.

ILLUSTRATIONS: Lehm. Mon. Pot. Suppl. *pl.* 6; Hook. Fl. Bor. Am. **1**: *pl.* 66. PLATE 28, *f.* 1; dissection of flower, *f.* 2; stamen, *f.* 3; pistil, *f.* 4; fruiting hypanthium and calyx, *f.* 5.

Stem slender but strict, 4–6 dm. high, silky, branched above. Stipules lanceolate or linear. Leaves of about 7 digitate leaflets, densely silky above, white-tomentose beneath; leaflets pectinately divided into narrowly linear lobes, which are generally stiff and with revolute margins. Cyme open but branches rather short and strict. Hypanthium silky-villous, in fruit about 8 mm. in diameter; bracts linear-lanceolate, much shorter than the triangular-lanceolate acuminate sepals. Corolla 10–15 mm. in diameter; petals obcordate, a little longer than the sepals.

P. flabelliformis differs from the related species in the leaves, which are divided to near the base into linear segments. They are also white-tomentose beneath and densely silky above. There are two forms; the one with narrow linear more or less revolute lobes and smaller flowers resembles Lehmann's figure in Hooker's Fl. Bor. Am., and is

therefore taken as the type; the other somewhat approaches *P. Blaschkeana* in the general habit and the size of the flowers, and may be known under the name:

55. *Potentilla ctenophora*.

Potentilla gracilis var. *flabelliformis* Torr. Bot. U. S. Expl. Exp. 289. In part. Wats. King's Exp. 5: 88. In part.

Potentilla gracilis Holz. Contr. U. S. Nat. Herb. 3: 223. In part.

Potentilla flabelliformis ctenophora Rydb. Bull. Torr. Bot. Club, 24: 7. 1897.

ILLUSTRATION: PLATE 28, f. 6, outline of basal leaf.

Stem stout, erect, 5–7 dm. high, sparingly silky-strigose or somewhat villous. Stipules about 2 cm. long, entire or deeply toothed. Basal leaves with petioles 1.5–3 dm. long, digitately 5–7-foliolate, sparingly silky above, more or less densely white-tomentose beneath. Stem leaves similar, but short-petioled or sessile; leaflets 5–10 cm. long, oblanceolate, divided to near the midrib into broadly linear acute segments, the margins not revolute. Cyme rather dense, with short branches. Flowers 1.5–2 cm. in diameter. Hypanthium densely silky; bractlets lanceolate, much shorter than the broadly ovate sepals. Petals broadly obovate, bright yellow, much exceeding the sepals. Stamens about 20.

This stands near to *P. Blaschkeana*, but I think it is without doubt a good species. I have had the opportunity to watch the two in the field and saw them often growing together, but never found an intermediate form, and in all the collections that have gone through my hands there are only the specimens from one locality, where I am in doubt as to which species to refer them, and these may be hybrids.

It is nearer related to the preceding species, and perhaps should rather be regarded as a variety of it, as intermediate forms are not lacking. The typical form of *P. ctenophora* is very unlike that of *P. flabelliformis*, differing in larger flowers, shorter and denser cyme, broader segments of the leaves, and by the fact that their margins are never revolute. The range of the two species is nearly the same, extending from Wyoming and Saskatchewan to British Columbia and Northern California.

§ 10. SUBJUGAE.

56. *Potentilla subjuga* Rydberg.

Potentilla subjuga Rydberg, Bull. Torr. Bot. Club, 23: 397. 1896.

ILLUSTRATIONS: Bull. Torr. Bot. Club, 23: pl. 274. PLATE 29, f. 1; fruiting hypanthium and calyx, f. 2; dissection of flower, f. 3; pistil, f. 4; stamen, f. 5.

Tufted, from a perennial root; stems many, 1–3 dm. high, silky-villous, few-leaved, rather divergently branched above, the lower portion covered with the brown scarious

lower stipules; upper stipules green, ovate, entire. Basal leaves many, digitately 5- (seldom 3-) foliolate with an additional pair of smaller leaflets on the petiole, about 1 cm. below the others; leaflets 1-4 cm. long, oblong or obovate, deeply incised into oblong rather obtuse segments, silky and green above, silky and white-tomentose beneath. Stem leaves generally ternate, few and reduced in size. Hypanthium silky-hirsute, in fruit 5-8 mm. in diameter; bractlets oblong, obtuse or acute, about a third shorter than the ovate-triangular acuminate sepals. Petals broadly obovate, exceeding the sepals. Stamens about 20. Style filiform, nearly terminal. Achenes smooth.

As before noted this somewhat resembles the species of the *gracilis* group, especially *P. fastigiata* in size and *P. pulcherrima* in the form of the leaflets and the pubescence. The latter has digitate or more or less pinnate leaves with approximate leaflets, but they are never, as in *P. subjuga*, digitately 5-foliolate with a pair of smaller ones some distance below. In *P. subjuga*, the leaflets are more deeply incised and the stem and branches stricter, and the latter rather divergent; they are few-flowered, as in *P. nivea*, from which the plant differs in the number of the leaflets.

Colorado: N. H. Patterson, No. 192, 1892 (from near Empire, type); 1885 (from Gray's Peak); C. S. Crandall, No. 184, 1892 (from Graymont); T. C. Porter, No. 44; Hall and Harbour, No. 160, mainly; No. 161, 1862.

57. *Potentilla quinquefolia*.

Potentilla nivea pentaphylla Lehm. Nov. Stirp. Pug. **9**: 69. 1851. Not *P. pentaphylla* Richt. 1815.

Lehm. in Hook. Fl. Bor. Am. **1**: 195; Turcz. Bull. Soc. Nat. Moscow, **16**: 607*; Lehm. Rev. Pot. 169; Walp. Ann. **2**: 509.

Potentilla nivea quinquefolia Rydb. Bull. Torr. Bot. Club, **23**: 302. 1896.

ILLUSTRATIONS: PLATE 30, *f. 1*; dissection of flower, *f. 2*; stamen, *f. 3*; pistil, *f. 4*; fruiting hypanthium and calyx, *f. 5*.

Rootstock rather short and thick; stems generally several, ascending, 1.5-2 dm. high, rather loosely silky-villous, more or less tinged with brown. Basal leaves rather many, with silky-villous petioles 3-5 cm. long, 5- (seldom 3-) foliolate, generally with the terminal leaflet short-petiolate, silky-villous above, white-tomentose beneath. Stem leaves trifoliolate; leaflets broadly obovate, cleft about half way to the midrib into oblong segments, 1.5-3 cm. long; stipules large, ovate, .5-1 cm. long. Hypanthium loosely silky; bractlets linear-lanceolate, somewhat shorter than the lanceolate sepals. Petals obovate, emarginate, a little exceeding the sepals. Stamens about 20. Pistils many; style short, filiform or slightly thickened at the base.

The species is somewhat intermediate between *P. nivea* and *P. pulcherrima*, but differs from both by the more deeply dissected leaves and the terminal leaflet which is generally somewhat petiolate. Most of the basal leaves are 5-foliolate, but, as a rule, some as well as the stem leaves are only 3-foliolate. It has been regarded as a variety of *P. nivea*, but it is much better to consider it as a distinct species. I have held the opinion that it was a hybrid between *P. pulcherrima* and *P. nivea* or *P. uniflora*, but Professor J. Macoun, who has collected it at several stations, has written me that it has not been found together with either of these species. I have found it in Montana at an altitude of 10,000 feet, where *P. pulcherrima* does not grow; I have not found *P. nivea* in Montana.

Saskatchewan: E. Bourgeau, 1857-8.

Alberta: John Macoun, No. 16721, 1897.

Rocky Mountains (probably in *Alberta*): John Macoun, 1887; No. 1459, 1879; No. 7294, 1891.

British Columbia: John Macoun, No. 1460, 1875.

Northwest Territory: John Macoun, No. 1467, 1881.

Montana: Rydberg & Bessey, No. 4397, 1897.

§ II. OVALES.

58. *Potentilla ovalis* Lehm.

Potentilla ovalis Lehm. Ind. Sem. Hort. Bot. Hamb. 1849: 9. 1849.

Lehm. Rev. Pot. 140; Hemsley, Biol. Cent. Am. 1: 376.

ILLUSTRATIONS: Lehm. Rev. Pot. pl. 50.

Perennial by a short rootstock; stem low, 2-3-flowered, appressed-silky. Leaves ternate, rather thick, green and subglabrous above, white-silky beneath; leaflets oval, serrate, except at the base; bractlets lanceolate, acute, much shorter than the three-toothed sepals. Petals obovate or nearly orbicular, white, exceeding the sepals.

The plant much resembles a *Fragaria*, especially an undeveloped *F. Virginiana*, but is easily distinguished by the three-toothed sepals and the dry fruit. It is a native of Mexico.

§ 12. FRIGIDAE.

59. *Potentilla flabellifolia* Hook.

Potentilla flabellifolia Hook.; Torr. & Gray, Fl. N. Am. 1: 442. 1840.

Dietr. Syn. Pl. 3: 183; Walp. Rep. 2: 34; Ann. 2: 505; Lehm. Rev. Bot. 153.

Newberry, Pac. R. R. Rep. 6: Part 3, 72; Rydb. Bull. Torr. Bot. Club, 23: 306.

Potentilla gelida Wats. Proc. Am. Acad. 8: 559. 1873. Not Meyer, 1831.

Brewer & Watson, Bot. Cal. 1: 180; Rattan, An. Key W. Coast Bot. 51; Greene, Fl. Fran. 1: 63.

Macoun, Cat. Can. Pl. 140.

ILLUSTRATIONS: Lehm. Rev. Pot. *pl.* 51. PLATE 31, *f.* 6; dissection of flower, *f.* 7; pistil, *f.* 8; stamen, *f.* 9; fruiting hypanthium and calyx, *f.* 10.

Stems from a scaly creeping rootstock, minutely puberulent, 2–3 dm. high, few-leaved. Stipules generally very broad, elliptic and obtuse, thin, .5–1 cm. long. Leaves ternate, very thin, in all specimens seen perfectly glabrous; leaflets broadly obovate, sometimes petiolate, deeply incised-serrate with obtuse teeth, entire toward the base and the lateral ones somewhat oblique. Flowers 1.5–2 cm. in diameter. Hypanthium minutely puberulent, or glabrous, in fruit nearly 1 cm. in diameter; bractlets oval, obtuse or acutish, about equalling the ovate acute sepals. Petals obovate, cuneate, deeply emarginate, exceeding the sepals by about one half.

This is near *P. gelida* and has generally been included therein, but differs in its much larger flowers, lighter foliage and a thicker creeping rootstock; it is best to regard it as at least a good variety, and if the isolated range is taken into consideration, it is still better to regard it as a species. *P. flabellifolia* is found on the higher mountains of Oregon and Washington, while *P. gelida* grows in the Caucasus and eastern Siberia.

60. *Potentilla Friesiana* Lange.

Potentilla Friesiana Lange, Consp. Fl. Groenl. 9. 1880.

Rosenvinge, *ibid.*, 656.

Potentilla maculata Fries. acc. to Lange, *l. c.*

ILLUSTRATIONS: Fl. Dan. *pl.* 2965.

Stems several from a thick rootstock, 1 dm. high or more, ascending or erect, pilose with long hairs. Basal leaves numerous, short-petioled, glutinous, long-pilose especially beneath. Stem leaves 1 or 2; leaflets broadly obovate, crenately 3–4-toothed at the apex. Cyme several-flowered, crisp-lanate and glandular; bractlets elliptic, obtuse, half as long as the ovate acute sepals. Petals twice as long as the sepals, broadly emarginate.

This species must be very nearly related to *P. nana* and perhaps represents only an overgrown form of that plant.

Greenland, Disco: *Th. Fries.

61. *Potentilla fragiformis* Willd.

Potentilla fragiformis Willd.; Schlecht. Mag. Ges. Naturf. Fr. Berlin, 7: 294. 1813.*

Lehm. Mon. 28 and 163; Seringe in DC. Prod. 2: 586; Sprengel, Syst. Veg. 2: 540; Don, Gard. Dict. 2: 550; Dietr. Syn. Pl. 3: 178; Walp. Ann. 2: 504; Lehm. Rev. Pot. 155.

Eat. Man. Ed. 7 : 456 ; Eat. and Wr. N. Am. Bot. 372 ; Watson, Proc. Am. Acad. 8 : 559 ; Rydb. Bull. Torr. Bot. Club, 23 : 305.

Lehm. in Hook. Fl. Bor. Am. 1 : 194 ; Ledebour, Fl. Ross. 2 : 59 ; Macoun, Cat. Can. Pl. 140.

Potentilla grandiflora fragiformis Ser. in DC. Prod. 2 : 572. 1825.

ILLUSTRATIONS: Lehm. Mon. Pot. *pl.* 15. PLATE 31, *f.* 1 ; dissection of flower, *f.* 2 ; pistil, *f.* 3 ; stamen, *f.* 4 ; fruiting hypanthium and calyx, *f.* 5.

Somewhat tufted ; stems several from the caudex, more or less villous, ascending or erect, 1–2 dm. high, few-leaved and few-flowered with rather long erect branches. Stipules ovate, the lower scarious, brown and acute, the upper herbaceous and obtuse or acute ; leaves ternate with sessile leaflets, more or less villous, the odd leaflet larger, ovate with cuneate base, the lateral ones obliquely elliptic or obovate, all toothed with obtuse and more rounded teeth than in *P. marginata*. Hypanthium villous, in fruit 10–15 mm. in diameter ; bractlets generally broadly elliptic and obtuse, equalling or often exceeding the ovate rather acute sepals. Petals obovate or broadly cuneate and deeply emarginate, about half longer than the sepals.

Differs from *P. nana* in being in every respect more robust and with stems 1–2 dm. high. It somewhat approaches *P. villosa* in habit, but lacks the tomentum and has much smaller flowers. It comes nearest the Caucasian and Siberian *P. gelida* Meyer, but differs in its hirsute pubescence. *P. fragiformis* is mainly Siberian, but has been collected on the Aleutian and Behring Sea Islands.

Alaska: J. M. Macoun, Nos. 34 and 44, 1891 ; Merriam, 1891 ; J. T. White, 1894.

Cape York: Grinnell's Arctic Exped.

62. *Potentilla nana* Willd.

Potentilla nana Willd ; Schlecht. Mag. Ges. Naturf. Fr. Berlin, 7 : 296. 1813.*

Lehm. Mon. 29 and 181 ; DC. Prod. 2 : 573 ; Dietr. Syn. Pl. 3 : 178 ; Walp. Rep. 2 : 33 ; Ann. 2 : 506 ; Lehm. Rev. Pot. 161.

Eat. Man. Ed. 7 : 456 ; Torr. & Gray, Fl. N. Am. 1 : 441 ; Eat. & Wr. N. Am. Bot. 372 ; Rydb. Bull. Torr. Bot. Club, 23 : 305 ; Britt. & Brown, Ill. Fl. 2 : 211.

Lehm. in Hook. Fl. Bor. Am. 1 : 194 ; Schlecht. Linnæa, 10 : 98 ; Hook. & Arn. Bot. Beechey's Voy. 123 ; Seemann, Bot. Herald, 29 and 55 ; Durand, Journ. Acad. Phil. 1856 : 190.

Potentilla verna Hook. in Scoresby's Greenl. 431 ; Hook. Sabine's Voy. 31.

Potentilla Groenlandica R. Br. in Ross' Voy. 142.

Potentilla nivea β R. Br. in Parry's 1st Voy. 277 (in part) ; Torr. & Gray, Fl. N. Am. 1 : 441 ; Hook. in Parry's 2d Voy. 15 ; Walp. Rep. 2 : 33.

Potentilla nivea arctica Cham. Linnaea, **2**: 21. 1827.

Walp. Ann. **2**: 508; Walp. Rep. **2**: 26; Lehmann, Stirp. Pug. **9**: 68; Del. Sem. Hort. Hamb. **1850**: 11; Lange, Consp. Fl. Groenl. **9**.

?*Potentilla frigida* Grev. Mem. Soc. Wern. 430.*

Macoun, Cat. Can. Pl. 140. Wetherill, Bot. Peary Aux. Exp. 5.

Potentilla fragiformis parviflora Traut.; according to Nathorst, Oefv. Kong. Vet. Ak. Förh., **1884**: 23-40. 1884.

Potentilla nivea concolor Don, Gard. Dict. **2**: 550. 1832.

Durand, Journ. Acad. Phil. **1856**: 190.

ILLUSTRATIONS: Lehm. Mon. Pot. *pl.* 17; Britt. & Brown, Ill. Fl. **2**: *f.* 1920.

PLATE 32, *f.* 1; dissection of flower, *f.* 2; pistil, *f.* 3; stamen, *f.* 4; fruiting hypanthium and calyx, *f.* 5.

Cespitose; stems 2-5 cm. high, generally one-flowered, pilose. Stipules broadly ovate, scarious and brown. Leaves ternate, pilose on both sides, short-petioled; leaflets broadly obovate-orbicular, toothed, with short and broad teeth, of which the terminal one is often the smallest. Hypanthium pilose-hirsute; bractlets oblong to elliptic, obtuse, about equalling the ovate acute sepals. Petals broadly obcordate, a little exceeding the sepals.

Dr. Watson states that this is a depauperate form of *P. emarginata*. As understood by Lehmann it is a plant much nearer related to *P. fragiformis*. The habit is cespitose as in *P. emarginata*, but the teeth of the leaves are rounded, the terminal one generally smaller, and the bractlets are broadly elliptic and enlarge in fruit as in *P. fragiformis*, from which it differs mainly in size, being in every respect smaller, and in the fact that the flowering stems scarcely exceed the leaves. A connecting link is formed by the Greenland *P. Friesiana*, which very closely resembles *P. nana* except that the flowering stems are elongated as in *P. fragiformis*. Probably all three are but forms of one species. Specimens collected by W. E. Meehan, No. 22, 1892, at McCormack Bay, are intermediate between this and *P. Friesiana*. *P. nivea arctica*, at least as to Richardson's plant must be included in *P. nana*. It ranges through arctic America from Labrador to Alaska, and is also found in eastern Siberia.

Greenland: Ryder, 1887; Th. M. Fries, 1871 (Disco).

Labrador & Hudson Bay: Kohlmeister; R. Bell, 1864 (Worthingham, Diggs and Upper Savage Islands).

Rocky Mountains: Drummond; John Macoun, No. 643, 1885 (Silver City); 1890 (Selkirk Mountains, Roger's Pass); No. 16744, 1897 (Forget-me-not).

Mackenzie River: Geological Survey of Canada, No. 1487, 1886.

Alaska: G. S. Oldmixon, No. 623, 1882 (Pt. Barrow).

63. *Potentilla emarginata* Pursh.

Potentilla emarginata Pursh, Fl. Am. Sept. 353. 1814.

Poir. in Lam. Enc. Meth. Suppl. 4: 541; Lehm. Mon. Pot. 29 and 174; Sprengel, Syst. Veg. 2: 540; Don, Gard. Diet. 2: 551; Dietr. Syn. Pl. 3: 179; Walp. Rep. 2: 35; Ann. 2: 506; Lehm. Rev. Pot. 161.

Nutt. Gen. N. A. Pl. 1: 310; Eat. Man. Ed. 5: 343; Ed. 6: 280; Ed. 7: 456; Torr. & Gray, Fl. N. Am. 1: 446; Eat. and Wr. N. Am. Bot. 372; Wats. Proc. Am. Acad. 8: 559; Rydb. Bull. Torr. Bot. Club, 23: 305; Britton & Brown, Ill. Fl. 2: 211.

E. Meyer, Pl. Lab. 74; Lehm. in Hook. Fl. Bor. Am. 1: 194; Sommerf. in Mag. Naturv. 2: 244*; Schlecht. Linnaea, 10: 98; Seemann, Bot. Herald, 51 and 56; Lange, Consp. Fl. Groenl. 8 and 235;¹ Rosenvinge, l. c. 655; Macoun, Cat. Can. Pl. 1: 140; Meehan, Proc. Acad. Phil. 1893: 210; Wetherill, Peary Aux. Exp. 5.

Potentilla Fragaria var. *emarginata* Ser. in DC. Prod. 2: 586. 1825.

ILLUSTRATIONS: Fl. Dan. 13: *pl.* 2291; Britton & Brown, Ill. Fl. 2: *f.* 1919. PLATE 32, *f.* 11; dissection of flower, *f.* 12; pistil, *f.* 13; stamen, *f.* 14; fruiting hypanthium and calyx, *f.* 15.

Low and densely tufted. Stems about 1 dm. high, 1-2-leaved and 1-2-flowered, softly villous-hirsute. Stipules lanceolate or ovate-lanceolate, scarious and brown. Leaves ternate with sessile leaflets, softly hirsute; leaflets obovate, with a cuneate entire base, deeply serrate toward the apex with acute teeth, of which the terminal is the largest. Hypanthium villous-hirsute, in fruit 8-10 mm. in diameter; bractlets oblong-lanceolate, acute, about equalling the slightly broader acute sepals. Petals broadly obcordate, longer than the sepals.

This species was described from specimens collected by Kohlmeister in Labrador. According to Lehmann (Hook. Fl. Bor. Am. 1: 194) *P. nana* also was collected by the same missionary. There is, therefore, a doubt which of the two is the original *P. emarginata*. The latter, as understood by Vahl, Lehmann and others, is a stouter plant than *P. nana*, has very narrow bracts, and leaves with acute teeth, of which the terminal is generally the largest. In both the flowering stems scarcely exceed the leaves. *P. emarginata* grows on the Arctic coast of North America, in Labrador, the Baffin Bay region, Greenland and Spitzbergen.

Alaska: (Pt. Barrow) G. S. Oldmixon, 1882; Mundock, No. 2227, 1896.

Wrangell Island: J. Muir, 1881.

Jones Sound: Dr. H. E. Wetherill, Nos. 144 and 160, 1894.

¹ Syn. *P. fragiformis parviflora* Traut.

Greenland: W. H. Burk, No. 24, 1891; Wm. E. Meehan, No. 22, 1892 (in part, Upernavik), I. J. Hayes, No. 21, 1861.¹

64. *Potentilla Robbinsiana* Oakes.

Potentilla Robbinsiana Oakes; Torr. & Gray, Fl. N. Am. **1** : 441. As synonym. 1838. Rydberg, Bull. Torr. Bot. Club, **23** : 304; Britt. & Brown, Ill. Fl. **2** : 211.

Potentilla minima β Torr. & Gray, Fl. N. Am. **1** : 441. 1840. Beck, Bot. Ed. **2** : 99.

Potentilla minima Walp. Rep. **2** : 33, 1813; Gray, Man. Ed. **1** : 122. 1848.

Wood, Class Book, 342; Bot. & Fl. 107; Ann. **2** : 505, 1852.

Potentilla frigida Gray, Man. Ed. **2** : 118, 1856; Ed. **5** : 154; Wats. & Coult. in Gray, Man. Ed. **6** : 160, 1890; Wats. Proc. Am. Acad. **8** : 560.

Potentilla minima Robbinsiana Lehm. Rev. Pot. 159. 1856.

ILLUSTRATIONS: Britt. & Brown, Ill. Fl. **2** : *f.* 1921. PLATE 32, *f.* 6; dissection of flower, *f.* 7; pistil, *f.* 8; stamen, *f.* 9; fruiting hypanthium and calyx, *f.* 10.

Cespitose; stems 2-3 cm. high, softly long-pilose, one-flowered, and with 1 or 2 diminutive leaves. Stipules ovate, obtuse, scarious and brown. Leaves ternate, short-petioled, villous-pilose especially beneath; leaflets obovate, cuneate at the base, deeply incised serrate with generally obtuse teeth. Hypanthium villous, in fruit 5-7 mm. in diameter; bractlets and sepals oblong, obtuse, subequal. Petals obovate, slightly exceeding the sepals.

Torrey and Gray placed this species as a variety under *P. minima* and Gray transferred it to *P. frigida*. It very much resembles both of those European species. It comes nearest to *P. minima* in habit, but to *P. frigida* in pubescence. It differs from both in the small petals, which about equal the sepals, and in the bracts and the sepals, which are narrow and subequal. In both *P. frigida* and *P. minima* the petals are longer than the sepals, and these much longer than the bractlets. The same characters that distinguish *P. Robbinsiana* from the two species mentioned distinguish it also from its American relatives. The range of *P. Robbinsiana* is very limited. It apparently is confined to the White Mountains of New Hampshire, where it was first collected by Robbins and Oakes.

Potentilla elegans Cham. & Schlecht. Linnæa, **2** : 22. 1827.

The species, as far as I know, has not yet been collected in America, but is mentioned here because it is quite common across Behring Strait and may be found in Alaska. It resembles *P. Robinsoniana* in the sepals and bracts, but is a more delicate plant, the leaflets being only 3-5 mm. long and nearly glabrous.

¹ Several other specimens are cited by Lange.

§ 13. BIFLORAE.

65. *Potentilla biflora* Willd.

Potentilla biflora Willd.; Schlecht. in Mag. Ges. Naturf. Fr. Berlin, **7**: 297. 1813.

Lehm. Mon. Pot. 30 and 192; Sprengel, Syst. Veg. **2**: 541; Seringe, in DC. Prod. **2**: 586; Don, Gard. Diet. **2**: 552; Dietr. Syn. Pl. **3**: 180; Lehm. Rev. Pot. 20; Ledeb. Fl. Ross. **2**: 61.

Eat. Man. Ed. 7: 457; Torr. & Gray, Fl. N. Am. **1**: 442; Eat. & Wr. N. A. Bot. 372; Wats. Proc. Am. Acad. **8**: 561; Rydb. Bull. Torr. Bot. Club, **24**: 13.

Richardson, in Frankl. 1st Journ. 740; Ed. 2, App. 21; Cham. and Schlecht. in Linnaea **2**: 24; Lehm. in Hook. Fl. Bor. Am. **1**: 195; Hook. and Arn. in Beechey's Voy. 123; Ledeb. Fl. Ross. **2**: 61; Seemann, Bot. Herald, 29; Macoun, Cat. Can. Pl. 140.

Potentilla bifolia Walp. Ann. **2**: 470. 1852.

ILLUSTRATIONS: Lehm. Mon. Pot. *pl. 20*; Rev. Pot. *pl. 62, f. 1*. PLATE 33, *f. 6*; dissection of flower, *f. 7*; pistil, *f. 8*; fruiting hypanthium and calyx, *f. 9*.

Cespitose; flowering branches scape-like, 1-2-, seldom few-flowered, erect, less than 1 dm. high, sparingly hirsute-villous. Stipules lanceolate, acuminate, brown. Leaves basal, ternate, with the middle leaflet deeply 3-divided, the lateral ones 2-divided into linear segments with more or less revolute margins, sparingly villous-hirsute, in age nearly glabrous above, and with a strong midrib beneath. Flowers less than 1 cm. in diameter. Hypanthium sparingly hairy, in fruit about 7 mm. in diameter; bractlets oblong, obtuse, about equalling the ovate-lanceolate acute sepals. Petals obovate, slightly emarginate, longer than the sepals, yellow with an orange spot.

It is a native of northeastern Asia, Alaska and the Arctic coast of North America, and a rather rare plant.

Alaska: Dr. Jerrans, 1894 (Cape Thomas); J. T. White, 1894 (Port Clarence); Muir. No. 112, 1881.

Wrangell Island: Dr. Ross, 1881.

§ 14. NIVEAE.

66. *Potentilla Pringlei* Wats.

Potentilla Pringlei Wats. Proc. Am. Acad. **23**: 272. 1888.

"Stem decumbent, a foot long or more including the paniculate few-flowered inflorescence, finely tomentose; leaves mostly radical, ternately digitate; leaflets broadly linear (1 or 2 inches long by about 2 lines broad), acutely toothed, nearly glabrous above, densely white-tomentose beneath; flowers

on very slender pedicels, rather large, yellow; calyx-lobes lanceolate, the accessory lobes (bractlets) linear. Stamens 20. Styles filiform, nearly terminal."—Watson, *l. c.*

Mexico, State of Chihuahua: C. G. Pringle, No. 1494. 1887.

67. *Potentilla Hookeriana* Lehm.

Potentilla Hookeriana Lehm. Ind. Sem. Hort. Bot. Hamb. 1849: 10. 1849.

Lehm. Stirp. Pug. 9: 18; Walp. Ann. 2: 509, Lehm. Rev. Pot. 163.

Wats. Proc. Am. Acad. 8: 554; Macoun, Cat. Can. Pl. 137; Rydb. Bull. Torr. Bot. Club, 23: 302.

ILLUSTRATIONS: Lehm. Rev. Pot. *pl.* 55. PLATE 33, *f.* 1; dissection of flower, *f.* 2; pistil, *f.* 3; stamen, *f.* 4; fruiting hypanthium and calyx, *f.* 5.

Stems several from the caudex, 1–2 dm. high, white-tomentose and silky-villous, ascending, few-leaved. Stipules lanceolate, acute. Leaves with petioles 1–2 cm. long, ternate or occasionally with a pair of small extra leaflets, white on both sides, silky-villous above, densely tomentose beneath; leaflets obovate in outline, about 1 cm. long, deeply cleft to near the midrib into oblong lobes; middle leaflet short-petioled. Flowers in small dense cymes, about 8–10 mm. in diameter. Hypanthium densely silky-villous, in fruit 5 mm. in diameter; bractlets linear, about equalling the lanceolate acute sepals. Petals obcordate, generally a little exceeding the sepals. Stamens 20.

Dr. Watson placed this with *P. Pennsylvanica* on account of the style; this is glandular, but scarcely thickened near the base, as it always is in *P. Pennsylvanica*. In habit it comes nearest to *P. nivea*; and as the style is often glandular in *P. villosa* and sometimes in *P. nivea*, it is better to include *P. Hookeriana* in this group, with which it agrees in other respects. It differs from *P. nivea* in the more deeply dissected leaves, the smaller flowers, the bractlets, which equal the sepals, and a slightly stricter habit. It is a very rare plant. The only specimens seen are:

Saskatchewan: Bourgeau (Palliser Exp.). 1857–8.

Montana: Wm. M. Canby, No. 103. 1883 (?).

Alberta: John Macoun, No. 16735. 1897.

Rocky Mountains: Drummond (Lat. 52° 56').

68. *Potentilla nivea* L.

Potentilla nivea L. Sp. Pl. 499. 1753.

Sp. Pl. Ed. 2: 715; Willd. Sp. Pl. 2: 1109; Vahl, Fl. Dan. *pl.* 1035*; Poir. in Lam. Enc. Meth. 5: 600; Persoon, Syn. Pl. 2: 56; Nestler, Mon. Pot. 29 and 73; Haller,

Syn. Pot. 51; Lehm. Mon. 30 and 184; Sprengel, Syst. Veg. 2: 540; Seringe in DC. Prodr. 2: 571; Don, Gard. Diet. 2: 549; Dietr. Syn. Pl. 3: 178; Walp. Rep. 2: 26 and 33; Ann. 2: 507; Lehm. Del. Sem. Hort. Hamb. 1850: 10; Rev. Pot. 166.

Pursh, Fl. Am. Sept. 353; Nutt. Gen. N. Am. Pl. 1: 310; Eat. Man. Ed. 5: 343; Ed. 6: 280; Ed. 7: 456; Torr. & Gray, Fl. N. Am. 1: 441; Eat. & Wr. N. Am. Bot. 372; Gray, Am. Jour. Sc. (II) 33: 411 (Rep. 22); Proc. Acad. Phil. 1863: 61; Porter, U. S. Geol. Surv. 1870: 475; Wats. in King's Rep. 5: 87; Proc. Am. Acad. 8: 558¹; Porter & Coult. Syn. Fl. Col. 37; Rothrock, in Wheeler's Rep. 4: 113; Coulter, Man. Rocky Mts. 85; Rydb. Bull. Torr. Bot. Club, 23: 302; Britt. & Brown, Ill. Fl. 2: 210.

Richardson, in Frankl. 1st Journ. 740; Ed. 2: App. 20; R. Br. in App. Parry's 1st Voy. 277; Cham. & Schlecht. in Linnaea, 2: 21; E. Meyer, Pl. Labr. 74; Lehm. Hook. Fl. Bor. 1: 195; Schlecht. in Linnaea, 10: 98; Ledeb. Fl. Ross. 2: 57; Seemann, Bot. Herald, 52; Durand, Journ. Acad. Phil. 1856: 190; Lange, Consp. Fl. Groen. 8 and 235; Rosenvinge, *ibid.* 656; Macoun, Cat. Can. Pl. 139 and 518; Nathorst, Oefv. Kong. Vet. Ak. Forh. 1884: 23; Meehan, Proc. Acad. Phil. 1893: 210; Wetherill, Bot. Peary Aux. Exp. 5.

Pragaria nivalis Crantz. Inst. 2: 177.

ILLUSTRATIONS: Fl. Dan. 6: *pl.* 1035; Sturm, Deutschl. Fl. 92: *pl.* 6*; Gmel. Fl. Sib. 3: *pl.* 36, *f.* 1; Britt. & Brown, Ill. Fl. 2: *fig.* 1918. PLATE 34, *f.* 6; dissection of flower, *f.* 7; stamen, *f.* 8; pistil, *f.* 9; fruiting hypanthium and calyx, *f.* 10.

Cespitose, with the caudex covered with the brown scarious stipules and old leaves. Stems several, 1–2 dm. high, more or less tomentose or villous, few-leaved. Basal leaves on petioles 2–5 cm. long, ternate, glabrate or slightly villous above, densely white-tomentose beneath; leaflets oblong-cuneate or obovate, 2–3 cm. long, generally coarsely crenate. Stem leaves similar but smaller. Cyme 2–6-flowered. Flowers 12–15 mm. in diameter. Hypanthium 6–8 mm. in fruit, white-villous or tomentose; bractlets linear, oblong or lanceolate, slightly shorter than the ovate lanceolate acute sepals. Petals obcordate, a little exceeding the sepals.

The common form of this species is fully as tall as *P. villosa* and *P. Hookeriana*, but very slender. The flowers are only 15 mm. in diameter, the bractlets linear-oblong or lanceolate, shorter than the ovate-lanceolate sepals. The obcordate petals only a little exceed the sepals. The leaflets are 2–3 cm. long, oblong or obovate, with broad teeth. *P. nivalis* is distributed throughout the arctic regions and in the higher mountains of the northern hemisphere. In America it ranges from Labrador to Alaska, extending in the Rockies

¹ Including *P. uniflora* and *P. Wahliana*.

as far south as Colorado. It is very variable. The varieties reported for North America are :

Potentilla nivea macrophylla Ser.

Potentilla nivea Lodd. Bot. Cab. 5, *pl.* 460. Not L.

Rottboell, Kjoeb. Selsk. Laer. & Vid. **10** : 450 ; R. Br. App. Parry's Voy. Supp. 277.

Potentilla nivea macrophylla Ser. in DC. Prod. **2** : 571. 1825.

Hook. Bot. Mag. **57** : *pl.* 2982 ; Lehm. Stirp. Pug. **9** : 68 ; Del. Sem. Hort. Hamb. **1850** : 12 ; Rev. Pot. 168 ; Don, Gard. Diet. **2** : 550 ; Dietr. Syn. Pl. **3** : 178 ; Walp. Am. **2** : 508 ; Rydb. Bull. Torr. Bot. Club, **23** : 302.

ILLUSTRATIONS : Rottboell, Kjoeb. Selsk. Laer. & Vid. **10** : *pl.* 7* ; Hook. Bot. Mag. **58** : *pl.* 2982 ; Lodd. Bot. Cab. **5** : *pl.* 460.

Leaves larger, 3-6 cm. long, coarsely serrate or incised ; plants generally taller.

Arctic and sub-arctic regions. Specimen seen :

Manitoba : John Macoun, 1881.

Potentilla nivea pallidior Swartz.

Potentilla nivea pallidior Swartz, Summa Veg. Scand. 19. 1814.

Lehm. Mon. 184 ; Wahlenb. Fl. Suec. 326.

Potentilla nivea subviridis Ledeb. Fl. Ross. **2** : 57. 1844.

Lehm. Stirp. Pug. **9** : 68 ; Lange, Consp. Fl. Groenl. 9 ; Rosenvinge, *ibid.* 656.

Leaves only sparingly tomentose beneath.

This approaches *P. nana* in habit, and grows in arctic Norway and Greenland.

Potentilla nivea Altiaca (Bunge).

Potentilla nivea pinnatifida Lehm. Stirp. Pug. **9** : 68 ; Rev. Pot. 168, 1856. Del. Sem. Hort. Hamb. **1850** : 12 ; Lange, Consp. Fl. Groenl. 236 ; Rosenvinge, *ibid.* 656.

Potentilla Altiaca Bunge, in Ledeb. Fl. Alt. 252 ; Ledeb. Fl. Ross. **2** : 58 ; Icon. Fl. Ross. Ill. **4** : *pl.* 329*.

Potentilla nivea dissecta Watson, Proc. Am. Acad. **8** : 559. 1873.

Macoun, Cat. Can. Pl. 139 and 518, 1883 ; Coulter, Man. Bot. Rocky Mts. 85 ; Rydb. Cont. U. S. Nat. Herb. **3** : 497. In part.

Potentilla nivea subquinata Lange, Consp. Fl. Groenl. 9 and 235, 1880-7 ; Rosenvinge, *ibid.* 656.

ILLUSTRATIONS ; Ledeb. Icon. Pl. Fl. Ross. **4** : *pl.* 329.

Leaves ternate as well as quinate ; leaflets rather small, deeply pinnately dissected.

Siberia, North America and Greenland. Watson's specimens agree exactly with the figure of *P. Altiaca* in Ledebour's Illustrations, and this name is the only one available, as both *dissecta* and *pinnatifida* have been used for other species, and *subquinata* is much more recent. Specimens of this variety seen:

British Rocky Mountains: Drummond; Macoun, No. 7333, 1890 (Kicking Horse Lake).

Utah: Watson, No. 335, 1869.

Potentilla nivea prostrata (Rottb.) Lehm.

Potentilla prostrata Rottb. Skrift. Kjob. Selsk. Laerd. & Vidensk. **10**: 453. 1765-9.

Potentilla nivea prostrata Lehm. Mon. **184**; Stirp. Pug. **9**: 69; Rev. Pot. 169; Ser. in DC. Prod. **2**: 572; Lange, Consp. Fl. Groenl. **9**; Rosenvinge, *ibid.*, 656; Don, Gard. Dict. **2**: 550; Walp. Ann. **2**: 509.

Stems prostrate, compressed; flowers glomerate at the top of the stem.

Occurs in Greenland.

Of these varieties var. *subviridis* approaches *P. nana*, var. *Altiaca*, *P. saximontana* and var. *prostrata*, *P. Hookeriana*.

69. Potentilla villosa Pall.

Potentilla villosa Pall.; Pursh, Fl. Am. Sept. 353. 1814.

Poir. in Lam. Enc. Meth. Suppl. **4**: 541; Lehm. Mon. Pot. 28 and 166; Sprengel, Syst. Veg. **2**: 540; Seringe in DC. Prodr. **2**: 573; Don, Gard. Dict. **2**: 550; Dietr. Syn. Pl. **3**: 178; Walp. Rep. **2**: 34; Ann. **2**: 507; Lehm. Rev. Pot. 171; Presl. Epim. Bot. 198.

Nutt. Gen. N. Am. Pl. **1**: 310; Eat. Man. Ed. 5: 343; Ed. 6: 280; Ed. 7: 456; Torr. & Gray, Fl. N. Am. **1**: 442; Eat. & Wr. N. Am. Bot. 372; Rydb. Bull. Torr. Bot. Club, **23**: 301.

Cham. & Schlecht. in Linnaea, **2**: 22; Bong, Veg. Ins. Sitcha, 132; Lehm. in Hook. Fl. Bor. Am. **1**: 194; Hook. & Arn. Bot. Beechey's Voy. 123; Ledeb. Fl. Ross. **2**: 58; Presl. Ep. 198; Seemann, Bot. Herald, 29; Coville, Cont. U. S. Nat. Herb. **3**: 339.

Potentilla lucida Willd.; Schlecht. Mag. Ges. Naturf. Fr. Berlin, **7**: 296. 1813.

Potentilla leucochroa Lindl. in Wall. Cat. Pl. Ind. Orient. No. 1019, fide Lehmann.

Potentilla fragiformis villosa Regel & Tiling, Fl. Ajan. 85*.

Wats. Proc. Am. Acad. **8**: 559. Macoun, Cat. Can. Pl. 140, 1883; Steinejer, Proc. U. S. Nat. Mus. **1885**: 532. 1885.

ILLUSTRATIONS: Lehm. Mon. Pot. *pl.* 16. PLATE 34, *f.* 1, dissection of flower, *f.* 2; pistil, *f.* 3; stamen, *f.* 4; fruiting hypanthium, *f.* 5.

Somewhat tufted. Stems several from the stout caudex, few-flowered, 1–3 dm. high, villous with spreading white hairs. Stipules ovate to elliptic, 10–15 mm. long, the lower scarious and brown, the upper silky and white-tomentose. Basal leaves stout-petioled, ternate, densely silky above and densely white-tomentose and with prominent veins beneath; leaflets 2–4 cm. long, broadly cuneate, obovate or nearly orbicular, the lateral ones much oblique, coarsely toothed. Stem leaves few, smaller and subsessile. Flowers 2–3 cm. in diameter. Hypanthium densely villous, in fruit 15–20 mm. in diameter; bractlets elliptic or broadly ovate, equalling or exceeding the triangular-ovate sepals. Petals yellow, broadly obovate, exceeding the sepals by one-half.

Watson follows Regel & Tiling in placing *P. villosa* as a variety under *P. fragiformis*. The two resemble each other in one important character, viz., the broadly oval obtuse bractlets, which, as well as the calyx, enlarge considerably in fruit. *P. villosa* differs from *P. fragiformis*, however, in the leaves as well as in the flowers; those of the former are much thicker, densely silky above (rarely glabrate), and densely floccose and with prominent veins beneath. The flowers are about one-half larger than those of *fragiformis*. It differs from all the species of the group in the large flowers, 2–3 cm. wide, stout habit, large leaves and broad bractlets. *P. villosa* is a native of Alaska and adjacent Asia, but is also found in the mountains of British Columbia, Vancouver Island and Washington.

Potentilla villosa chrysocoma.

Potentilla villosa aurca Lehm. Pug. Stirp. **9**: 67. 1851. Not *P. aurca* L.
Lehm. Rev. Pot. 171.

Pubescence of the whole plant yellow. It approaches *P. Vahliaana* in some respect. *Alaska*: B. J. Bretherton (Kodiak), 1894; Ferd. Bishoff (Sitka) 1865–6; Eschscholtz (Unalaska).

70. *Potentilla uniflora* Ledeb.

Potentilla uniflora Ledeb. Mem. Acad. Petersb. **5**: 543. 1812.

Lehm. Mon. **29** & 183; Ser. in DC. Prod. **2**: 572; Sprengel, Syst. Veg. **2**: 541.

Potentilla macrantha uniflora Don, Gard. Dict. **2**: 550. 1832.

Potentilla nivea γ Torr. & Gray, Fl. N. Am. **1**: 441. In part. 1840.

Potentilla villosa uniflora Ledeb. Fl. Ross. **2**: 58. 1844.

Potentilla nivea γ *macrantha* f. *uniflora* Lehm. Del. Sem. Hort. Hamb. **1850**: 11, 1850. Stirp. Pug. **9**: 68; Rev. Pot. 167.

Potentilla niva uniflora Rydberg, Bull. Torr. Bot. Club, **23**: 303. 1896.

Potentilla niva Fahliana Wats. Bibl. Index, **1**: 298. In part.

ILLUSTRATIONS: Lehm. Mon. *pl.* 18. PLATE 35, *f.* 3; dissection of flower, *f.* 4; pistil, *f.* 5; stamen, *f.* 6; fruiting hypanthium and calyx, *f.* 7.

Densely caespitose, the caudex covered with the dark brown scarious stipules and remains of old leaves. Stems about 5 cm. high, more slender than in *P. Fahliana*, slightly villous or tomentose, nearly scapose or with few very small leaves, 1–2-flowered. Leaves crowded, ternate, silky or glabrate above, densely white-tomentose beneath; leaflets 1–1.5 cm. long, broadly cuneate or rhombic-obovate, deeply cut from the apex into coarse oblong lanceolate teeth. Flowers 15–20 mm. in diameter. Hypanthium white or grayish, villous or somewhat tomentose, about 8 mm. in diameter; bractlets oblong or lanceolate, nearly equalling the ovate lanceolate acute sepals. Petals yellow, obcordate, nearly twice as long as the sepals.

The true position of this plant is difficult to determine. It may be placed as a variety of *P. niva* or of *P. Fahliana* or as a species intermediate between the two. Ledebour made it a variety of *P. villosa*, which it somewhat resembles as to the leaves. It has the caespitose habit, short nearly leafless stems, and short wedge-shaped leaves of *P. Fahliana*. Its flowers are nearly of the same size as those of that species, but the petals are obcordate, not obreniform, and the sepals and bracts are those of *P. niva*, depauperate forms of which may grade into it. It is found in the arctic regions from Greenland to Alaska and adjacent Asia, but also in the Rocky Mountains to Colorado. Apparently all specimens labelled *P. niva Fahliana* from the Rockies belong to *P. uniflora*. It was evidently this form that Watson had in mind when he made the statement that *P. Fahliana* was a depauperate few-flowered form of *P. niva*.

Colorado: H. N. Patterson, 1885; No. 195, 1892; C. S. Crandall; C. F. Baker, No. 18, 1896; Alice Eastwood, 1892; C. C. Parry; T. S. Brandegee, 1880; G. E. Osterhout, 1893.

Montana: W. M. Canby, No. 104.

Oregon: Dr. Lyall, 1861.

Alberta: J. Macoun, No. 7. 1897.

British Columbia: John Macoun, No. 33, 1890.

Rocky Mountains: E. Bourgeau, 1853; J. Macoun, No. 639, 1885; No. 1481, 1879; No. 7332, 1890; Nos. 7331 and 7338, 1891.

Greenland: H. E. Wetherill, No. 18, 1894.

71. *Potentilla Vahliaana* Lehm.

Potentilla Vahliaana Lehm. Mon. Pot. 29 and 172. 1820.

Hornem. Nomencl. Fl. Dan. Emend. 66 and 118; Sprengel, Syst. Veg. 2: 541; Don, Gard. Diet. 2: 551; Walp. Ann. 2: 507; Lehm. Rev. Pot. 170.

Eat. Man. Ed. 7: 456; Eat. & Wr. N. Am. Bot. 372; Rydb. Bull. Torr. Bot. Club, 23: 303.

Lehm. in Hook. Fl. Bor. Am. 1: 194; Seemann, Bot. Herald, 51; Lange, Consp. Fl. Groenl. 8 and 235; Rosenvinge, *ibid.* 655; Nathorst. Oefv. Kong. Vet. Ak. Förh. 23-34; Holm, Proc. Acad. Phil. 1895: 544.

Potentilla hirsuta Hornem. Dansk. Oecom. Pl. Ed. 2: 500.*

Hornem. Fl. Dan. 8: *pl.* 1390; Vahl in DC. Prod. 2: 573.

Potentilla Jamesoniana Greville, Mem. Wern. Soc. 3: 417. 1821.

DC. Prod. 2: 586; Sprengel, Syst. Veg. 2: 542.

Potentilla nivea Vahliaana Seemann, Bot. Herald, 29; Macoun, Cat. Can. Pl. 139, in part.

Potentilla nivea hirsuta Durand, Proc. Acad. Phil. 1863: 94. 1863.

Potentilla pulchella Meehan, Proc. Acad. Phil. 1893: 210. 1893.

Potentilla nivea β R. Br. in App. Parry's 1st Voy. 277, 1824 (in part); Hook. Parry's 2d Voy. App. 15 (in part).

Potentilla nivea γ Torr. & Gray, Fl. N. Am. 1: 441, in part.

ILLUSTRATIONS: Fl. Dan. 8: *pl.* 1390; Grev. Mem. Wern. Soc. 3: *pl.* 20. PLATE 35, *f.* 8; dissection of flower, *f.* 9; pistil, *f.* 10; stamen, *f.* 11; fruiting hypanthium and calyx, *f.* 12.

Densely caespitose, the stout woody much branched, caudex covered with the brown scarious stipules and remains of old leaves. Flowering stems nearly leafless, 1-2-flowered, about 5 cm. high, densely covered with yellowish hairs. Leaves crowded, short-petioled, ternate, silky above, slightly tomentose and rather densely yellowish-villous beneath; leaflets generally less than 1 cm. long, cuneate and coarsely dentate at the apex. Flowers about 15-20 mm. in diameter. Hypanthium yellowish silky-villous, about 1 cm. in fruit; bractlets and sepals broadly ovate or elliptic, often obtuse, subequal. Petals nearly orange, broadly obcordate, overlapping each other and often broader than long, nearly twice as long as the sepals.

This is very low and matted, the large flowers a little exceeding the leaves. The petals are very broadly obreniform, *i. e.*, broader than long, and therefore overlap each other; the bractlets are broadly oval, obtuse and about equal the ovate sepals. The

whole plant is covered with yellowish villous hairs besides the tomentum. Lehmann was in some doubt whether he should regard it as a variety of *P. nivea* or as a distinct species. He made it a species on the authority of Vahl, who knew the plant in its native habitat. Seeing only *P. nivea* and *P. Vahliana* nobody would hesitate in assigning specific rank to the latter. The trouble arises when one is to draw the line between either and *P. uniflora*. Lehmann states that *P. Vahliana* was collected by Richardson in Captain Franklin's journey. Specimens collected by Richardson and named *P. Vahliana* are in the Torrey Herbarium at Columbia, but these belong to *P. uniflora*. There is, however, from the same collector one specimen, a very small one, indeed, which without any doubt belongs to *P. Vahliana*, but this is, together with two specimens of *P. nana*, under the name *P. nivea arctica*. Except this specimen and one from Herald Island, all specimens seen are from Greenland and the islands of Hudson and Baffin Bay. They are generally labelled *P. pulchella*. The latter species is easily distinguished by its small flowers, the petals scarcely exceeding the sepals, and its deeply dissected leaves which are pinnate with two approximate pairs of leaflets.

Greenland: Dr. H. E. Wetherill, Nos. 70 and 82, 1894; No. 174, 1894; Vahl; Rink; L. Krumlein, 1877-8; William E. Meehan, No. 19, 1892; W. H. Burk, No. 21, 1891.¹

Herschell Island: Rev. J. D. Stringer, 1893.

Arctic Coast of North America: Richardson.

Hudson Bay: J. W. Tyrrell, No. 7254, 1893 (Marble Island).

Herald Island: Capt. C. L. Hooper, 1881.

§ 15. MULTIFIDAE.

72. *Potentilla Sommerfeltii* Lehm.

Potentilla Sommerfeltii Lehm. Del. Sem. Hort. Bot. Hamb. 1849: 6. 1849.

Lehm. Stirp. Pug. 9: 4; Rev. Pot. 37; Walp. Ann. 2: 474; Lange, Consp. Fl. Groen. 4; Rydberg, Bull. Torr. Bot. Club, 23: 265.

ILLUSTRATIONS: Lehm. Rev. Pot. pl. 10, f. 2. PLATE 35, f. 1; pistil, f. 2.

Cespitose; caudex covered with the brown scarios broadly ovate stipules. Stem 3-5 cm. high, slightly silky, scapose, 1-2-flowered. Leaves pinnate, of two pairs of leaflets, and a stalked terminal one, glabrate above, finely tomentose beneath; leaflets obovate in outline, divided to near the middle into linear-oblong obtuse segments. Bractlets oblong, obtuse, much shorter than the similar sepals. Petals obovate-cuneate, a little exceeding the sepals.

¹ Several other specimens are cited by Lange and Rosenvinge.

Closely resembles *P. pulchella*, but is still smaller and differs in the smaller flowers, the lack of the long hairs, and the stalked terminal leaflet. It is a native of Spitzbergen and Greenland, but one specimen at least has been collected on the arctic coast of the American Continent; this was sent to Dr. Torrey from Dr. Hooker, under the name *P. pulchella*, but the collector's name does not appear on the label.

77. *Potentilla pulchella* R. Br.

Potentilla pulchella R. Br. in Ross' Voy. 142; Ed. 2, 193.

Sprengel, Syst. 4: part 2, 198; Seringe in DC. Prod. 2: 582; Lehm. Mon. Pot. Suppl. 1: 14; Stirp. Pug. 3: 25; Don, Gard. Dict. 2: 556; Dietr. Syn. Pl. 3: 185; Walp. Rep. 2: 33; Ann. 2: 474; Lehm. Rev. Pot. 36.

Eat. Man. Ed. 7: 459; Torr. & Gray, Fl. N. Am. 1: 439; Eat. & Wr. N. Am. Bot. 374; Wats. Proc. Am. Acad. 8: 554; Rydb., Bull. Torr. Bot. Club, 23: 265.

R. Br. in Parry's 1st Voy. Suppl. 277; Hook in App. Parry's 2d Voy. 15; Parry's 3d Voy. 202; Hook. Fl. Bor. Am. 1: 191; Seemann, Bot. Herald, 29; Durand, Journ. Acad. Phil. 1856: 190; Lange, Consp. Fl. Groen. 4¹ and 234; Rosenvinge, *ibid.* 654; Nathorst. Afv. Kong. Vet. Ak. Förh. 1884: 23; Macoun, Cat. Can. Pl. 137 and 517.

Potentilla sericea Grev. in Mem. Wern. Soc. 3: 430, Eat. & Wright. N. Am. Bot. 374.

Potentilla Keilhavii Sommerf. (Bidr. Spitzb. Fl.) in Mag. Naturv. 2: 244,* Lindb. Regensb. Bot. Zeit. 2: 485. 1842.*

Potentilla nivea pulchella Durand, Proc. Acad. Phil. 1863: 94. 1863.

ILLUSTRATIONS: Lehm. Mon. Suppl. 1: *pl.* 7, *f.* 1. Fl. Dan. 13: *pl.* 2234. PLATE 36, *f.* 6; dissection of flower, *f.* 7; pistil, *f.* 8; stamen, *f.* 9; fruiting hypanthium and calyx, *f.* 10.

Cespitose, or with short prostrate branches from a perennial caudex covered with the brown scarious stipules. Stem generally less than 1 cm. long, subscapose, few-flowered, silky-hirsute with yellowish hairs. Leaves short-petioled, pinnate, with 2 pairs of leaflets and a sessile terminal one, yellowish-silky and also a little tomentose beneath; leaflets obovate-cuneate in outline, deeply dissected into linear-lanceolate segments, the lower pair smaller and often entire. Hypanthium yellowish-silky; bractlets oblong, shorter than the ovate sepals. Petals obovate, retuse, a little exceeding the calyx.

P. pulchella is generally a very small plant, tufted with many spreading stems from the perennial root. The stems are generally less than 1 dm. long, but in one specimen seen fully 3 dm. The leaves have only two pairs of leaflets, and the terminal leaflet is

¹ Also var. *clatior*.

generally sessile. It is generally quite hairy with long and yellowish white hairs. In general habit and flowers it comes near *P. Vahliana*, which has been mistaken for it; but the latter has always only 3 leaflets.

Spitzbergen, Greenland, arctic coast of America, and Wrangel Island, eastern Siberia.

Greenland: H. C. Hart; Parry; Dr. Hayes, No. 20, 1861; A. Hartz, No. 8022, 1890.¹

Arctic America: R. Bell, No. 1454, 1884 (Hudson Strait); No. 1480a (Diggs Island); 1893 (Cape Prince of Wales); J. W. Tyrrell, 1893 (lat. 64°, long. 100°); Dr. Bissel (Polaris Bay).

Wrangel Island: J. Muir, 1881.

74. *Potentilla litoralis* Rydberg.

Potentilla litoralis Rydberg, Bull. Torr. Bot. Club, **23**: 264. 1896.

Britton & Brown, Ill. Fl. **2**: 214.

Potentilla Pennsylvanica Gray, Man. 122, 1848; Gray Man. Ed. 2: 119; Ed. 5: 154;² Wood, Class Book, 343;² Bot. & Flor. 108;² Wats. Proc. Am. Acad. **8**: 553;² Wats. & Coult. in Gray, Man. Ed. 6: 159.²

ILLUSTRATIONS: Britt. & Brown, Ill. Fl. **2**: *f.* 1930. PLATE 37, *f.* 1; dissection of flower, *f.* 2; stamen, *f.* 3; pistil, *f.* 4; fruiting hypanthium and calyx, *f.* 5.

Stem decumbent or ascending, 2–4 dm. long, simple, slightly appressed silky-strigose. Lower stipules lanceolate, scarious and brown, the upper ovate, green, more or less toothed. Leaves pinnate, of two approximate pairs of leaflets, the lower pair the smaller, or subdigitately 5-foliate, grayish tomentose and veiny beneath, nearly glabrous above, Leaflets obovate, divided to near the midrib into linear-oblong obtuse divisions. Hypanthium strigose and slightly tomentose, in fruit about 8 mm. in diameter. Bractlets lanceolate-oblong, nearly equalling the ovate-triangular sepals. Petals obovate, cuneate, truncate or slightly emarginate, about equalling the calyx. Stamens 20–25. Style short, terminal, thickened and glandular at the base. Achenes smooth.

A near relative of *P. Pennsylvanica*, but differs in the ascending or spreading stem, the sparser pubescence, the leaves, which have fewer and approximate leaflets, often almost digitate, and the sepals which are more distinctly ribbed. *P. litoralis* is principally a beach plant, or at least growing near the coast, while *P. Pennsylvanica* is an inland, plain or mountain species. The following specimens belong to *P. litoralis*.

¹Several other specimens are cited by Lange and Rosenvinge.

²Includes also the true *P. Pennsylvanica*.

New Hampshire: Oakes and Robbins (Isle of Shoals); W. M. Canby.

Maine: Wm. Boott (Cape Elizabeth); M. L. Fernald; E. P. Bicknell, 1893.

Newfoundland: Waghorne, No. 8, 1895.

Quebec: J. A. Allen, 1881 (Shores of St. Lawrence).

Labrador: J. A. Allen, 1882.

Hudson Bay: Bell, No. 1443 in part, 1884.

75. *Potentilla multifida* L.

Potentilla multifida L. Sp. Pl. 496. 1753.

L. Sp. Pl. Ed. 2: 710; Willd. Sp. Pl. 2: 1096; Ait. Hort. Kew. 2: 213; Poir. in Lam. Enc. Meth. 5: 585; Ait. Hort. Kew. Ed. 2, 3: 274; Persoon, Syn. Pl. 2: 54; Nestler, Mon. Pot. 23 and 33; Haller, Syn. 56; Lehm. Mon. 22; Ser. in DC. Prod. 2: 581; Spreng. Syst. Veg. 2: 535; Ledeb. Fl. Ross. 2: 42; Lehm. Rev. Pot. 34; Don, Gard. Dict. 2: 560; Dietr. Syn. Pl. 3: 189; Walp. Ann. 2: 473; Rydb. Bull. Torr. Bot. Club, 23: 264; Britton & Brown, Ill. Fl. 2: 215.

ILLUSTRATIONS: Ser. Mus. Helv. 1: *pl. 8*;* Britt. & Brown, Ill. Fl. 2: *f. 1931*. PLATE 37, *f. 6*; dissection of flower, *f. 7*; stamens, *f. 8*; pistil, *f. 9*; fruiting hypanthium and calyx, *f. 10*.

Stems many from the caudex, low, at last spreading, generally less than 2 dm. high, appressed silky-strigose. Stipules large, lanceolate, acuminate, more or less scarious and brown. Leaves pinnate, of 2-3 pairs of leaflets, grayish-tomentose beneath, smooth above; leaflets pectinately divided to very near the midrib into linear acute revolute divisions. Hypanthium silky-strigose, in fruit 5-7 mm. in diameter; bractlets oblong-lanceolate, acute, a little shorter than the ovate-lanceolate acute sepals. Petals cuneate, emarginate, a little exceeding the sepals.

This is a species which somewhat resembles *P. bipinnatifida*, but the plant is spreading or ascending, the leaflets only 5 to 7, their segments nearly filiform with revolute margins, the stipules long-acuminate, scarious and brown, the sepals narrower and the style not thickened and glandular at the base. It is not rare in northern and alpine Europe and Asia, but I have seen only the following specimens from America.

Great Slave Lake: Miss E. Taylor, No. 50. 1892.

Hudson Bay: R. Bell, 1880 (York Factory); No. 1443 in part, 1879 (Churchill River).

Lake Nipigon: Macoun, No. 1444a. 1884.

76. *Potentilla glabrella*.

Potentilla sericea glabrata Hook. Fl. Bor. Am. 1: 189. 1833. Not *P. glabrata* Lehm.

Eat. Man. Ed. 7: 458; Torr. & Gray, Fl. N. A. 1: 437; Lehm. Rev. Pot. 34; Torr. Fremont's 1st Exp. 89 (174); Don, Gard. Dict. 2: 560; Seemann, Bot. Herald, 29; Dietr. Syn. Pl. 3: 189; Walp. Rep. 2: 32; Ann. 2: 473.

Potentilla Pennsylvanica glabrata Wats. Proc. Am. Acad. 8: 554. 1873.

Macoun, Cat. Can. Pl. 137 and 517, 1883-6; Coult. Man. Rocky Mts. 85, 1885; Rydb. Bull. Torr. Bot. Club, 23: 264.

Stem generally erect and strict, rather low, 1–2 dm. high, glabrate or sparingly puberulent. Stipules ovate, pectinately toothed. Leaves pinnate, of 2–5 rather approximate pairs of leaflets, glabrate or slightly puberulent; leaflets obovate to oblanceolate, the lower ones smaller, very deeply dissected into oblong acute or obtuse segments. Cyme rather few-flowered. Hypanthium hirsute or puberulent; bractlets narrowly ovate, somewhat shorter than the broadly ovate sepals, both rather strongly veined. Petals obovate, about equalling the sepals. Stamens 20. Pistils very numerous; style short, fusiform.

It is somewhat intermediate between *P. Pennsylvanica* and *P. litoralis*, resembling the former in the erect habit, and in the form of the leaflets and their segments, and the latter in the more approximate and fewer leaflets, the sparse pubescence and the strongly nerved sepals. It is a high mountain plant, its range extending from British America to Nevada.

Assiniboia and Alberta: John Macoun, 1880 and 1885.

Saskatchewan: John Macoun, No. 12567, 1896; Drummond.

Montana: J. W. Blankinship, No. 62, 1890 (in part).

Nevada: S. Watson, No. 326, 1868 (in part).

77. *Potentilla atrovirens*.

Stem stout, 2–3 dm. high, branched, with erect branches, dark colored, densely pilose. Leaves very dark green, densely pilose on both sides, strongly veined, pinnate with 3–4 pairs of leaflets, these obovate to oblanceolate, coarsely dissected about half way to the midrib into oblong segments. Cyme narrow, many-flowered, with erect branches. Hypanthium densely pilose, about 8 mm. in diameter when fully developed. Sepals and bractlets subequal, ovate, exceeded by the cuneate-obovate bright yellow petals. Stamens about 20, short. Pistils very numerous; style short, fusiform.

It much resembles some forms of *P. Pennsylvanica*, but differs in the dark color of the plant, the erect branches of the cyme, the longer petals and the different pubescence. It is a rare plant and only a few specimens are known.

Wyoming: Aven Nelson, No. 2017a, 1896 (Douglas Creek, type).

South Dakota: P. A. Rydberg, No. 667, 1892, in part.

Minnesota: B. C. Taylor, No. 375, 1891; Max Menzel.

78. *Potentilla Pennsylvanica* L.

Potentilla Pennsylvanica L. Mant. Pl. 76. 1867.

Ait. Hort. Kew. 2: 214; Ed. 2, 3: 275; Willd. Sp. Pl. 2: 1099; Persoon, Syn. Pl. 2: 54; Nestler, Mon. Pot. 24 and 36; Lehm. Mon. Pot. 21 and 55; Sprengel, Syst.

Veg. **2**: 533; Seringe in DC. Prod. **2**: 281; Don, Gard. Diet. **2**: 557; Dietr. Syn. Pl. **3**: 186; Walp. Rep. **2**: 32; Ann. **2**: 479; Lehm. Rev. Pot. 57.

Michx. Fl. Bor. Am. **1**: 304; Pursh, Fl. Am. Sept. 356; Nutt. Gen. N. Am. Pl. **1**: 310; Eat. Man. Ed. 2: 380; Ed. 3: 408; Ed. 5: 344; Ed. 6: 281; Ed. 7: 458; Torr. Fl. U. S. 499; Comp. 211; Beck, Bot. 107; Ed. 2: 99; Torr. and Gray, Fl. N. Am. **1**: 438; Eat. and Wr. N. A. Bot. 373; Gray, Pl. Fendl. in Mem. Am. Acad. **4**: 42; Man. Ed. 5: 154;¹ Pac. R. R. Rep. **12**: book 2, part 2: 39; Wood, Class Book, 343; Watson, King's Rep. **5**: 86; Proc. Am. Acad. **8**: 553;¹ Rothrock, in Wheeler's Exp. **4**: 112; Coulter, Man. Rocky Mts. 84; Wats. & Coult. in Gray, Man. Ed. 6: 159;¹ Rydb. Fl. Neb. **21**: 16; Bull. Torr. Bot. Club, **23**: 263; Britton & Brown, Ill. Fl. **2**: 214.

Richardson, in Frankl. 1st Journ. 739; Ed. 2: App. 20; Lehm. in Hook. Fl. Bor. Am. **1**: 187; Ledeb. Fl. Ross. **2**: 40;² Hook. & Arn. Beechey's Voy. 123; Macoun, Cat. Can. Pl. 136¹ and 516.

Potentilla normalis Besser, in Sprengel. Syst. Veg. **4**: 199. 1825.

Potentilla Missouriica Schrad. Ind. Sem. Bot. Goett. 1821-32; Linnæa, **8**: Litt. 26; Lindl. Bot. Reg. **17**: pl. 1412.

Potentilla Pennsylvania communis Torr. & Gray, Fl. N. Am. **1**: 438. 1838.

Potentilla Pennsylvania Missouriica Lehm. Rev. Pot. 59, 1856; Walp. Ann. **2**: 480. 1852.

ILLUSTRATIONS: Jacq. Hort. Vind. **2**: pl. 189; Lindl. Bot. Reg. **17**: pl. 1412; Britt. & Brown, Ill. Fl. **2**: f. 1929. PLATE 39, f. 1 (basal leaf).

Stem generally erect, strict, 4-8 dm. high, more or less woolly tomentose. Stipules ovate in outline, 1-2 cm. long, often pectinately divided. Leaves pinnate, with 3-7 pairs of leaflets, grayish-tomentose and veiny beneath, in the typical form nearly glabrous above, the lower long-petioled, the upper subsessile; leaflets gradually reduced downward, the rachis often somewhat decurrent, in the typical form oblong or oblanceolate in outline, divided half-way to the midrib into oblong divisions, the margins scarcely at all revolute. Cyme dense, with erect branches. Flowers short-pedicel. Hypanthium densely pubescent, tomentose and strigose. Bractlets lanceolate, acute, equalling the ovate-triangular acute sepals, generally not prominently veiny. Petals obovate, cuneate, slightly emarginate or truncate, about equalling the sepals.

There is some doubt as to whether this is the true *P. Pennsylvania* L. The description of the leaves of that species seems to indicate rather *P. litoralis*. The form representing *P. Missouriica* has been cultivated in Europe under the name of *P. Pennsylvania*. The same form was also figured by Jacquin in Hort. Vind. **2**: pl. 189, under that name.

¹ Includes *P. litoralis*.

² Probably var. *strigosa*.

Dr. Lehmann held that Jacquin's figure represented the typical Linnaean species. Torrey and Gray, in *Fl. N. Am.*, regarded *P. Missouriica* as a synonym of the typical *P. Pennsylvanica*. I have therefore accepted that name for this very variable species.

P. Pennsylvanica is generally erect, 4–8 dm. high and more or less woolly-tomentose. The leaves are truly pinnate, with 3–7 pairs of leaflets, which in the typical form are grayish tomentose beneath and nearly glabrous above, the broad oblong divisions with scarcely revolute margins.

The typical *P. Pennsylvanica* is a comparatively rare plant, ranging in British America from Hudson Bay to the Rockies, and in these extends southward to Colorado.

***Potentilla Pennsylvanica strigosa* Pursh.**

Potentilla Pennsylvanica strigosa Pursh, *Fl. Am.* Sept. 356. 1814.

Poir; *Lam. Enc. Meth. Suppl.* 4 : 543; Don, *Gard. Dict.* 2 : 557; *Lehm. Mon. Pot.* 55; *Rev. Pot.* 58; *Dietr. Syn. Pl.* 3 : 186; *Walp. Rep.* 2 : 32; *Ann.* 2 : 479.

Eat. Man. Ed. 2 : 380; *Ed.* 3 : 408; Torr. & Gray, *Fl. N. Am.* 1 : 438; Gray, *Am. Journ. Sc. (II.)* 33 : 411 (*Rep.* 22); *Proc. Acad. Phil.* 1863 : 61; Porter, *U. S. Geol. Surv.* 1871 : 481; Coulter, *ibid.*, 1872 : 756; Wats. *Proc. Am. Acad.* 8 : 554; Porter & Coulter, *Syn. Fl. Colo.* 36; Coulter, *Man. Rocky Mts.* 84; Wats. & Coult. in Gray, *Man. Ed.* 6 : 159; Rydb. *Cont. U. S. Nat. Herb.* 3 : 157 and 496; *Fl. Neb.* 21 : 16; *Bull. Torr. Bot. Club*, 23 : 263; Britt. & Brown, *Ill. Fl.* 2 : 214.

Lehm.; Hook. *Fl. Bor. Am.* 1 : 188; Macoun, *Cat. Can. Pl.* 137 and 517; *Ledeb. Fl. Alt.* 1 : 356.

Potentilla strigosa Pall.; Pursh, *Fl. Am.* Sept. 356. As synonym. 1814.

Lessing, *Linnaea*, 9 : 154; *Tratt. Ros. Mon.* 4 : No. 31.

Potentilla pectinata Fisch.; Hook. *Fl. Bor. Am.* 1 : 188. As synonym. 1833.

Potentilla rubricaulis Dougl. ex *Lehm. Rev. Pot.* 58. 1856. Not *Lehm.*

Potentilla absinthiiifolia Dougl. ex *Lehm. Rev. Pot.* 58. 1856.

ILLUSTRATIONS : PLATE 38, *f.* 2; dissection of flower, *f.* 3; pistil, *f.* 4; stamen, *f.* 5; fruiting hypanthium and calyx, *f.* 6.

Stem generally lower; pubescence mixed with long rather spreading villous hairs. Leaflets deeply divided into narrow lobes, which have revolute margins and are grayish tomentose beneath and more or less villous above.

This is the most common form of *P. Pennsylvanica*, found in the same range as the species, but also extending over the plains to Kansas and New Mexico. Also in northern Asia.

Potentilla Pennsylvanica arachnoidea Lehm.

Potentilla Pennsylvanica arachnoidea Lehm. Stirp. Pug. **9** : 41. 1851.

Rev. Pot. 59; Walp. Ann. **2** : 479; Rydberg, Bull. Torr. Bot. Club, **23** : 264.

Potentilla arachnoidea Dougl. ex Lehm. Rev. Pot. 59. 1856.

Potentilla Pennsylvanica conferta Gray, Mem. Am. Acad. **1849** : 42. 1849.

Plant in every part smaller; segments short; stem arachnoid-pubescent. Colorado, Utah and New Mexico. Specimens seen:

New Mexico : A. Fendler, No. 202, 1847 (in part); E. O. Wooton, No. 408, 1892.

Utah : L. F. Ward, 1875; M. E. Jones, No. 5673, 1894.

Colorado : G. Engelmann, 1874; J. M. Coulter, 1873; C. C. Parry, No. 216, 1861; E. L. Greene, 1870; A. Eastwood, 1892.

Arizona : E. Palmer. 1877.

79. Potentilla pseudosericea.

Potentilla holosericea Nutt. MS. Not Griseb.

ILLUSTRATIONS: PLATE 36, *f. 1*; dissection of flower, *f. 2*; stamen, *f. 3*; pistil, *f. 4*; fruiting hypanthium and calyx, *f. 5*.

Cespitose; stems several from the caudex, ascending or decumbent, 5–10 cm, high, few-leaved, grayish silky. Lower stipules brown and scarious, covering the caudex; upper ones small, 5 mm. long, ovate, silky. Leaves with rather short petioles, pinnate with 2–4 pairs of approximate leaflets, grayish silky or hirsute above, white-tomentose and silky beneath; leaflets 1–2 cm. long, obovate in outline, divided to near the middle into linear obtuse segments. Cyme few-flowered. Hypanthium grayish silky, in fruit about 5 mm. in diameter; bractlets oblong, shorter than the ovate or ovate-lanceolate sepals, Petals obovate, about equalling the sepals.

Nevada : Shockley, No. 592, 1888.

Rocky Mountains : Nuttall; Fremont, No. 218, 1845–7.

P. holosericea Nutt. is cited as a synonym under *P. Pennsylvanica strigosa* by Torrey and Gray, but Nuttall's specimens show that it is a species very nearly related to *P. bipinnatifida*. Nuttall's specimens, as well as Fremont's, may be taken for depauperate forms of that species, while Shockley's much resemble in habit, leaves and pubescence the Siberian *P. sericea*, the petals of which, however, are nearly twice as long as the narrow sepals. Dr. Watson included Shockley's specimens in *P. Hookeriana*, which it resembles in pubescence and the form of the segments, but the sepals of that species are much narrower and the leaves ternate.

80. *Potentilla bipinnatifida* Dougl.

Potentilla bipinnatifida Douglas; Hooker, Fl. Bor. Am. **1**: 188. 1833.

Eat. Man. Ed. 7: 458; Eat. & Wr. N. A. Bot. 374; Walp. Ann. **2**: 480; Don, Gard. Diet. **2**: 558.

Potentilla arguta Lehm. Mon. 21 and 62. 1820. Not Pursh, 1814.

Spreng. Syst. Veg. **2**: 534; Schlecht. & Cham. Linnaea, **2**: 26.

Potentilla agrimonoides var. Bieb. Fl. Taur. Cauc. **3**: 354, fide Lehmann.

Potentilla Biebersteiniana Tratt. Ros. Mon. **4**: No. 24.

Potentilla candicans Fisch; Lehm. Rev. Pot. 60. 1856.

Potentilla Pennsylvanica bipinnatifida Torr. & Gray, Fl. N. A. **1**: 438. 1840.

Lehm. Rev. Pot. 60; Macoun, Cat. Can. Pl. 137; Hook. Journ. Bot. **6**: 220; Walp. Rep. **2**: 32; Dietr. Syn. Pl. **3**: 186; Rydb. Bull. Torr. Bot. Club, **23**: 263; Britt. & Brown, Ill. Fl. **2**: 214.

Potentilla Pennsylvanica arguta Ser. in DC. Prod. **2**: 581. 1825.

ILLUSTRATIONS: PLATE 39, *f. 1*; dissection of flower, *f. 2*; stamen, *f. 3*; pistil, *f. 4*; fruiting hypanthium and calyx, *f. 5*.

Stems several from a perennial root, erect or ascending, strict and simple, leafy, finely white silky-villous, 3–5 dm. high. Basal leaves many, with petioles 5–10 cm. long, pinnate, with 3 or 4 approximate pairs of leaflets, densely and finely silky above, white-tomentose beneath; leaflets 2–4 cm. long, obovate in outline, pectinately divided to near the midrib into almost linear, mostly obtuse segments. Stem leaves similar, but short-petioled or sessile and often subdigitate. Stipules ovate or lanceolate, 2–4 cm. long, sometimes toothed. Cyme dense and contracted. Hypanthium white-silky, in fruit about 8 mm. in diameter; bractlets oblong-lanceolate, shorter than the ovate sepals. Petals obovate, cuneate, truncate, about equalling the sepals.

Lehmann regards this as a distinct species in Hooker's *Flora Boreali-Americana*, but, following Torrey and Gray, reduces it to a variety of *P. Pennsylvanica* in his *Revisio*. As he mentions a glabrate form of *P. bipinnatifida*, he must have had *P. litoralis* in view. *P. bipinnatifida* is also much nearer related to that species than to *P. Pennsylvanica*, having the same leaf form and general habit, but is more erect and densely silky and tomentose. In all the material examined I have found but a single specimen that in any way could be regarded as a connecting link. This, as well as *P. Pennsylvanica*, it is a plant confined to the northwestern plain region, extending from Saskatchewan and Alberta to Colorado.

Potentilla bipinnatifida platyloba.

Potentilla pulcherrima Rydb. Fl. Neb. 21: 16. 1895. Not Lehm.

ILLUSTRATIONS: PLATE 39, f. 6-7.

Stouter; leaves pinnate with generally but two pairs of obovate leaflets with short broadly lanceolate or oblong lobes. Stipules very large and broad. Bractlets broadly oblong. Sepals ovate. Hypanthium nearly cylindric, in fruit equalling the sepals. Cyme with erect branches in fruit.

A rare form and perhaps specifically distinct, but the flowers (although somewhat larger) and the pubescence are exactly the same as in *P. bipinnatifida*. It needs to be studied in the field. The following specimens illustrate this variety:

Nebraska: Smith & Pound, No. 85, 1892; Williamson.

Hudson Bay: Bell, No. 1442, in part, 1880 (York Factory).

Alberta: J. Macoun, No. 1, 1897.

Assiniboia: John Macoun, No. 10457, 1895.

§ 16. RUBRICAULES.

81. *Potentilla filicaulis* (Nutt.) Rydb.

Potentilla effusa filicaulis Nutt.; Torr. & Gray, Fl. N. A. 1: 437. 1840.

Lehm. Rev. Pot. 64; Walp. Rep. 2: 32; Ann. 2: 480.

Potentilla filicaulis Rydb. Bull. Torr. Bot. Club, 24: 2. 1897.

ILLUSTRATIONS: PLATE 40, f. 5; dissection of flower, f. 6; pistil, f. 7; stamens, f. 8; fruiting hypanthium and calyx, f. 9.

Cespitose, stems several from the caudex, erect or ascending, 1 dm. high or less, silky-strigose, few-leaved. Stipules ovate-lanceolate, acute, 5-10 mm. long. Basal leaves many, pinnate with 2-3 pairs of approximate leaflets or subdigitately 5-7-foliolate, densely silky on both sides and slightly tomentose beneath; leaflets cuneate, 1-2 cm. long, coarsely toothed with ovate teeth. Stem leaves small. Cyme few-flowered. Hypanthium white-silky, in fruit 4-5 mm. in diameter; bractlets oblong, much shorter than the ovate or ovate-lanceolate acute sepals. Petals obovate, much longer than the sepals.

This species was first published as a variety of *P. effusa*, but it is more closely related to *P. Hippiana*, having the same pubescence and the same form of bractlets and sepals. It may be a depauperate state of that species, but no truly intermediate forms have been seen.

The following specimens belong here:

Rocky Mountains: Nuttall.

Colorado: Pammel, 1896.

Idaho: J. M. Coulter, 1872.

82. *Potentilla Macounii*.

ILLUSTRATION: PLATE 41, *f. 1*.

Cespitose; stems generally more than one from the caudex, ascending, silky-villous, less than 1 dm. high, 1-2-leaved. Stipules ovate, 5-10 mm. long. Basal leaves many, pinnate with 3-5 pairs of rather approximate leaflets, silky on both sides and somewhat tomentose beneath; leaflets cuneate, about 1 cm. long, deeply cleft into oblong segments; stem leaves much reduced. Cyme few-flowered. Hypanthium silky-villous, in fruit 7-8 mm. in diameter; bractlets lanceolate, often nearly as long as the ovate sepals. Stamens about 20. Style filiform.

It much resembles the preceding species in habit, but differs in the larger bractlets, the longer and looser hairiness and the more numerous and deeply dissected leaflets. It is apparently nearly related to *P. pinnatisecta*, from which it differs mostly in the hairiness, the tomentum and the broader segments of the leaves.

Alberta: John Macoun, No. 16709, 1897 (Crow's nest Pass).

Montana: Flodman, No. 556, 1896 (Little Belt Mountains).

83. *Potentilla luteosericea*.

Perennial by a thick deep root and a short erect caudex. Stems several, decumbent or ascending, .5-2 dm. long, few-leaved, yellowish-silky. Basal leaves pinnate, with 1 or 2 approximate pairs of leaflets, densely yellowish-silky canescent on both sides; leaflets cuneate or obovate, entire at the base, 3-7-toothed toward the apex. Hypanthium yellowish-silky, about 5 mm. in diameter; bractlets ovate, obtuse, a little shorter than the ovate-lanceolate acutish sepals. Petals obcordate, light yellow, exceeding the sepals by about a third.

This resembles somewhat the figure of *P. Dombeyi* in Nestler's Monograph, but that plant, according to Nestler and Lehmann, is only sparingly pilose.

Lower California: T. S. Brandegee, 1893 (San Pedro Martin; type in Herb. Calif. Acad. Sci.).

84. *Potentilla rubricaulis* Lehm.

Potentilla rubricaulis Lehm. Stirp. Pug. 2: 11. 1830.

Hook. Fl. Bor. Am. 1: 191; Eat. Man. Ed. 7: 459; Torr. & Gray, Fl. N. A. 1: 438; Rev. Pot. 68; Eat. & Wr. N. Am. Bot. 374; Don, Gard. Dict. 2: 556; Dietr. Syn. Pl. 3: 185; Walp. Rep. 2: 32; Ann. 2: 482.

ILLUSTRATIONS: Lehm. Rev. Pot. *pl. 30*. PLATE 40, *f. 1*; pistil, *f. 2*; stamen, *f. 3*; fruiting hypanthium and calyx, *f. 4*.

More or less cespitose; stems ascending or prostrate, generally not much over 1 dm. long, appressed silky-strigose, more or less leafy and branched. Stipules ovate, acute. Leaves pinnate of 2-3 approximate pairs and a sessile terminal leaflet, silky above, more or less white-tomentulose beneath; leaflets 5-10 mm. long, obovate or oblong in out-

line, deeply dissected into narrowly oblong segments. Cyme rather few-flowered with erect branches. Flowers 12–16 mm. in diameter, on rather slender pedicels. Hypanthium silky; bractlets linear-oblong, shorter than the narrowly lanceolate acute sepals. Petals obovate, a third exceeding the sepals.

It much resembles *P. subjuga*, but differs in the prostrate or ascending thicker stems and the narrow cyme, the branches of which are not divergent. The terminal leaflets are never 5, as is generally the case in *P. subjuga*. Following Gray and Watson, I mistook a form of *P. dissecta*, with leaves slightly tomentose beneath for *P. rubricaulis* of Lehmann. I had then seen only a depauperate form of the present species and did not recognize it. Tweedy's specimens from Pike's Peak, Colorado, answer very well both Lehmann's description and plate. When more material has been received and the species made better known, it may be shown that both *P. minutifolia* and *P. saximontana* are forms of this species, but at present they seem to be well defined. The following specimens of *P. rubricaulis* have been examined:

Colorado: F. Tweedy, No. 209, 1896; Patterson, 1876; Alice Eastwood, 1892; S. L. Clarke, No. 91, 1895; C. F. Baker, No. 17, 1896; G. E. Osterhout, 1894; No. 12 and 13, 1897.

Alberta: J. Macoun, No. 16736, 1897.

Wyoming: F. Tweedy, No. 205, 1897.

85. *Potentilla minutifolia* Rydb.

Potentilla minutifolia Rydberg, Bull. Torr. Bot. Club, **23**: 399. 1896.

ILLUSTRATIONS: Bull. Torr. Bot. Club, **23**: *pl.* 275, *f.* 6–10. PLATE 42, *f.* 6; fruiting hypanthium and calyx, *f.* 7; dissection of flower, *f.* 8; pistil, *f.* 9; stamen, *f.* 10.

Cespitose; stems about 1 dm. long, slender, 1–2-leaved, sparingly silky or nearly glabrous, slightly striate. Stipules ovate-lanceolate, the lower scarious and brown. Basal leaves very small, with slender petioles 3–5 cm. long, silky-hirsute, slightly grayish beneath, pinnate with two pairs of leaflets, the upper pair and the sessile odd leaflet about 5 mm. long, the lower pair only 2–3 mm.; leaflets obovate, incised, with oval rounded segments. Flowers 1 or 2, about 15 mm. in diameter. Hypanthium sparingly hirsute, in fruit 7–8 mm. in diameter; bractlets oblong, generally obtuse, about half as long as the oblong-lanceolate obtuse or acutish sepals. Petals obovate, about a half longer than the sepals.

This somewhat resembles *P. rubricaulis*, but differs in the small size of the plant and of the leaves, and their short and rounded segments.

Colorado: Wm. M. Canby (Pike's Peak) 1895; Osterhout, No. 11, 1897.

86. *Potentilla tenerrima* Rydb.

Potentilla tenerrima Rydberg, Bull. Torr. Bot. Club, **23**: 398. 1896.

ILLUSTRATIONS: Bull. Torr. Bot. Club, **23**: *pl.* 275, *f.* 1-5. PLATE 42, *f.* 1; fruiting hypanthium and calyx, *f.* 2; dissection of flower, *f.* 3; pistil, *f.* 4; stamen, *f.* 5.

Tufted from a perennial root; stems many, very slender, generally tinged with red, 1-1.5 dm. high, sparingly strigose; stipules linear-lanceolate, acuminate, about 1 cm. long, the lower scarious and brown. Leaves digitately 3-foliolate, with a pair of smaller leaflets below, or pinnate with 2 pairs of leaflets and the terminal leaflet sessile, finely silky and a little grayish tomentulose beneath; leaflets obovate or oblanceolate in outline, divided to near the midrib into linear acute segments. Flowers on slender pedicels, nearly 1 cm. in diameter. Hypanthium silky-strigose, in fruit .5 cm. in diameter; bractlets linear, acute, very little shorter than the narrowly lanceolate sepals. Petals obovate, slightly retuse, a little exceeding the sepals. Stamens about 20. Style filiform, nearly terminal. Achenes smooth.

This resembles a very slender form of *P. rubricaulis*, but the plant is usually more erect. The segments of the leaflets are also much narrower, as also the bractlets and sepals, which are narrower than in any other North American species.

Colorado: Brandegee, No. 950, 1874 (from Bergen's Park, type); Hall and Harbour, No. 160 (in part, in the Harvard Herbarium); L. H. Pammel, 1895.

87. *Potentilla saximontana* Rydberg.

Potentilla saximontana Rydb. Bull. Torr. Bot. Club, **23**: 399. 1896.

Potentilla nirea Rothrock, Rep. U. S. Geogr. Surv. **6**: 113. Name and locality only. 1878. Not L.

ILLUSTRATIONS: Bull. Torr. Bot. Club, **23**: *pl.* 277, *f.* 6-10. PLATE 43, *f.* 6; fruiting hypanthium and calyx, *f.* 7; dissection of flower, *f.* 8; stamen, *f.* 9; pistil, *f.* 10.

Densely caespitose; stems several, 1-3-flowered, less than 5 cm. long, silky pubescent. Basal leaves numerous, pinnate with 2-3 often approximate pairs of leaflets, silky pubescent and somewhat tomentose beneath, short-petioled; leaflets deeply dissected into oblong obtuse or acute segments. Flowers about 1 cm. in diameter. Hypanthium densely silky; bractlets oblong, obtuse, shorter than the broadly ovate-triangular sepals. Petals broadly obcordate, much longer than the sepals. Stamens about 20. Style nearly terminal, about equalling the smooth achene.

It somewhat resembles *P. rubricaulis*, but is still more caespitose, has much broader sepals and leaves, which have mostly much shorter petioles. The leaves are some-

what like those of *P. pinnatisecta* (Wats.) Aven Nelson (*P. ovina* Macoun), but are slightly tomentose. The flowers are much larger and the sepals much broader than in that species. It also resembles somewhat *P. Sommerfeltii*, but has much more dissected leaves, and the style is different. The following specimens have been examined:

Colorado: John Wolf, No. 366, 1873 (Wheeler's expedition, type); Hooker & Gray, 177 (Torrey's Peak); Knowlton, No. 19, 1896 (Pike's Peak).

§ 17. BREVIFOLIAE.

88. *Potentilla brevifolia* Nutt.

Potentilla brevifolia Nutt.; Torr. & Gray, Fl. N. Am. **1**: 442. 1840.

Dietr. Syn. Pl. **3**: 183; Walp. Rep. **2**: 34; Ann. **2**: 482; Lehm. Stirp. Pug. **9**: 43; Rev. Pot. 46.

Wats. Proc. Am. Acad. **8**: 560; Rydberg, Bull. Torr. Bot. Club. **23**: 306.

ILLUSTRATIONS: PLATE 44; *f. 1*; dissection of flower, *f. 2*; pistil, *f. 3*; stamen, *f. 4*; fruiting hypanthium and calyx, *f. 5*.

Plant very low, subcespitose. Stems less than 1 cm. high, slender, 1-2-leaved, terete, glandular-puberulent. Stipules about .5 cm. long, broadly ovate, entire, the lower scarious. Basal leaves many, small, pinnate with 1-2 pairs of leaflets, puberulent. Leaflets suborbicular with cuneate base, 2-3-cleft and crenate, .5-1 cm. long. Stem leaves 1 or 2, much reduced and subsessile. Hypanthium glandular-puberulent, sometimes with a few long hairs, in fruit less than .5 cm. Flowers about 8 mm. in diameter. Bractlets oblong, obtuse or acutish, a little shorter than the sepals, which are broadly ovate and acute or slightly mucronate. Petals a little longer than the sepals, yellow, obovate and often a little notched.

This species has leaves with about two pairs of rounded 2-3-cleft and crenate leaflets, which are rather small, only .5-1 cm. long. Lehmann included it in the *Glandulosae* on account of the habit, which a little resembles that of the group mentioned, and the fact that the plant is somewhat glandular-puberulent. The style is very slender, filiform, not basal, but attached near the apex of the achene; the anthers are not flat, and are plainly divided into two lobes, and the petals are emarginate. It is confined, as far as known, to the alpine peaks of Oregon and Wyoming.

Oregon: Nuttall; Wm. C. Cusick, No. 1378, 1886.

Wyoming: F. Tweedy, No. 204, 1897. (Head of Buffalo Fork.)

89. *Potentilla Grayi* Wats.

Potentilla Grayi Wats. Proc. Am. Acad. 8 : 560. 1873.

Bot. Cal. 1 : 179 ; Porter & Coult. Syn. Fl. Col. 37 ; Brew. & Wats. Bot. Cal. 1 : 179 ; Curran, Bull. Cal. Acad. Sci. 1 : 136 ; Rattan, An. Key W. Coast Bot. 51 ; Greene, Fl. Fran. 1 : 63 ; Rydb. Bull. Torr. Bot. Club, 23 : 306.

Potentilla Clarkiana Kellogg, Proc. Cal. Acad. Sci. 7 : 94. 1876.

ILLUSTRATIONS : PLATE 44, *f. 6* ; dissection of flower, *f. 7* ; stamen, *f. 8* ; pistil, *f. 9* ; fruiting hypanthium and calyx, *f. 10*.

Somewhat tufted. Stems subscapose, 5–15 cm. high, minutely strigose or glabrous, few-flowered. Stipules ovate, acute, entire or often few-toothed. Leaves basal, pinnate with the middle leaflet long-petiolate, sparingly hirsute or glabrate, shining ; leaflets 1–2 cm. long, very broadly obovate or sometimes nearly orbicular in outline, entire at the base, upwards coarsely 5–7-toothed, with the terminal tooth generally smaller. Flowers on slender pedicels, about 1 cm. in diameter. Hypanthium strigose, in fruit 7–8 mm. in diameter ; bractlets ovate or oval, generally obtuse and only half as long as the ovate, generally acute sepals. Petals orbicular or broadly ovate, slightly retuse, longer than the sepals.

In this species the leaflets are only three, broadly obovate or nearly orbicular. The habit of the plant reminds one somewhat of *P. flabellifolia*, but the middle leaflet is considerably stalked, showing that the leaf is pinnate with only one pair, rather than ternate. As the style is of the same form and the same place of attachment as in *P. brevifolia*, it is better to let the two constitute a group by themselves, especially as the habit and flower are nearly the same. *P. Grayi* has been collected only in the mountains around the Yosemite valley, California, at an altitude of 7000–10000 feet.

California ; A. Gray, 1872 ; A. Kellogg ; H. N. Bolander, No. 4971, 1866 ; W. H. Brewer, No. 1685, 1863 ; J. W. Congdon, 1885, No. 196, 1896 ; Galen Clarke ; J. G. Lemmon, No. 84 (in part), 1875.

§ 18. MULTIJUGAE.**90. *Potentilla millefolia* Rydberg.**

Potentilla millefolia Rydberg, Bull. Torr. Bot. Club, 23 : 433. 1896.

ILLUSTRATIONS : Bull. Torr. Bot. Club, 23 : *pl. 277, f. 1–5*. PLATE 43, *f. 1* ; fruiting hypanthium and calyx, *f. 2* ; dissection of flower, *f. 3* ; stamen, *f. 4* ; pistil, *f. 5*.

Low, prostrate or spreading ; stems numerous from the caudex, about 1 dm. long, few-leaved, only a little exceeding the basal leaves, appressed-strigose, often sparingly so. Lower stipules lanceolate and scarious and brown, the upper ovate-lanceolate, acute or

acuminate, green, often 2-3-cleft. Basal leaves pinnate, of many leaflets, sparingly strigose-ciliate, nearly as long as the stems. Stem leaves much reduced; leaflets divided nearly to the base into linear subulate divisions, which therefore look as if verticillate; pedicels slender, 1-2 cm. long, in fruit abruptly reflexed below the strigose-hirsute hypanthium. Bractlets and sepals lanceolate, acute, the former slightly smaller. Corolla 12-18 mm. in diameter. Petals obcordate, deeply notched, longer than the sepals. Stamens about 20. Achene smooth with a slender filiform nearly terminal style.

P. millefolia most resembles *P. Plattensis*, but differs in the long and very narrow segments of the leaves, the reflexed fruiting calyx and the longer sepals. The following specimens have been examined:

California: J. G. Lemmon, 1873; 1874; No. 86, 1875 (type), and No. 38; E. L. Greene, No. 750, 1876; J. W. Congdon, No. 277, 1880; T. S. Brandegee, 1887 and 1892; Baker & Nutting, 1894.

91. *Potentilla Arizonica* Greene.

Ivesia pinnatifida Wats. Proc. Am. Acad. **20**: 364. 1885. Not *P. pinnatifida* L.

Potentilla Arizonica Greene, Pittonia, **1**: 104. 1887.

ILLUSTRATIONS: PLATE 45, *f. 2*; dissection of flower after blooming, *f. 3*; pistil, *f. 4*; fruiting hypanthium and calyx, *f. 5*.

Perennial with a thick woody branched caudex. Stems ascending or erect, a little over 1 dm. high, subscapose, grayish strigose. Leaves nearly all basal, rather irregularly pinnate, with 7-12 pairs of leaflets, grayish strigose-hirsute; leaflets obovate in outline, divided to near the midrib into 7-9 linear diverging segments. Stipules brown, adnate to the petiole for a long distance, striate. Cyme 5-8-flowered. Hypanthium strigose, in fruit 5-8 mm. in diameter; bractlets oblong or lanceolate, a little shorter than the ovate sepals. Petals unknown. Stamens 20.

This was described by Watson from fruiting specimens and referred to *Ivesia*. These fruiting specimens, which are the only ones I have seen, show very plainly that the plant is a true *Potentilla* nearest related to *P. pinnatisecta* and *P. Richardii*. It should not be placed in *Ivesia*, even if the latter is regarded as a subgenus of *Potentilla*, as it has all the characters of a true *Potentilla*.

Arizona: J. G. Lemmon and wife, 1884 (near Flagstaff).

92. *Potentilla pinnatisecta* (Wats.) Aven Nelson.

Potentilla pinnatisecta Aven Nelson, Wy. Exp. Sta. Bull. **28**: 104. 1896.

Rydb. Bull. Torr. Bot. Club, **23**: 432.

Potentilla diversifolia var. *pinnatisecta* Wats. King's Rep. 5: 87. In part. 1871.

Potentilla ovina J. M. Macoun, Can. Rec. Sci. 6: 464. 1895.

ILLUSTRATIONS: PLATE 46, *f.* 1; dissection of flower, *f.* 2; pistil, *f.* 3; stamen, *f.* 4; fruiting hypanthium and calyx, *f.* 5.

Subcespitose. Stems mostly erect, less than 1 dm. high, strigose, with 2 or 3 reduced leaves, 3-6-flowered. Stipules smaller than in *P. Plattensis*, ovate, lanceolate, acute. Basal leaves crowded, 2-4 cm. long, hoary, especially when young, pinnate with many crowded leaflets; leaflets deeply cleft into oblong obtuse lobes. Hypanthium hirsute, in fruit about 8 mm. in diameter and erect; bractlets and sepals lanceolate, acute, the former shorter. Corolla about 1 cm. in diameter. Petals obovate, about a third longer than the sepals.

The specimens from which *P. diversifolia pinnatisecta* were described, viz.: Watson's Nos. 331 and 332 of the King Expedition illustrate, I think, not less than three different species. In the Gray Herbarium, No. 331 is represented, as it seems, by a typical *P. Plattensis*. This is doubtless the reason why Watson afterwards transferred the var. *pinnatisecta* to that species. No. 332, which Watson, in King's Report, characterizes as an alpine more hairy form, is there represented by a specimen of what James Macoun describes as *P. ovina*. This may be regarded as the typical *P. pinnatisecta*, as the other forms of the collection are already named. In the Columbia Herbarium, No. 331 is represented by an unusually large form of *P. pinnatisecta* (*P. ovina* Macoun) and No. 332 by a depauperate specimen of *P. Breweri* var. *expansa* Wats.

The main differences between *P. Plattensis* and *P. pinnatisecta* are well pointed out by Professor Nelson, *l. c.*, only that his characterizing of *P. Plattensis* refers rather to the most common, more prostrate form with narrow segments, mentioned below, and that his specimens representing *P. pinnatisecta* are unusually large, less hairy and with longer segments than usual. The typical form is subcespitose, seldom over 1 dm. high, with nearly leafless flowering stems, smaller stipules than in *P. Plattensis*, and a densely hoary pubescence, especially when young. It ranges from Colorado and Utah to British America, and is a strictly alpine plant. Specimens examined:

Colorado: C. S. Crandall, 1891; Osterhout, No. 7, 1897.

Wyoming: F. H. Burglehaus, 1893; F. Tweedy; J. N. Rose, No. 385, 1893; C. C. Parry, No. 97, 1873; Aven Nelson, No. 1819, 1895.

Utah: S. Watson (King's Exp.) Nos. 331 and 332 (in part).

Montana: W. M. Canby, No. 101, 1883; R. S. Williams, No. 753, 1888; Flodman, Nos. 549, 550 and 551, 1896.

British America: John Macoun, 1885.

Yellowstone Nat. Park: F. Tweedy, No. 470; F. H. Burglehaus, 1893.

Alberta: John Macoun, Nos. 10488, 10489 and 10493, 1895; Nos. 4 and 15, 1897.

Assiniboia: John Macoun, Nos. 10483 and 10484, 1895.

93. *Potentilla Plattensis* Nutt.

Potentilla Plattensis Nutt.; Torr. & Gray, Fl. N. Am. **1**: 439. 1840.

Dietr. Syn. Pl. **3**: 187; Walp. Rep. **2**: 32; Ann. **2**: 472; Lehm. Rev. Pot. 28.

Gray. Proc. Acad. Phil. **1863**: 64; Wats. Proc. Am. Acad. **8**: 556;¹ Brewer & Wats. Bot. Cal. **1**: 179; Porter & Coult. Syn. Fl. Colo. 36; Rothrock, in Wheeler's Exp. **6**: 113; Coulter, Man. Rocky Mts. 85; Rattan, An. Key W. Coast Bot. 51; Greene, Fl. Fran. **1**: 64; Coville, Cont. U. S. Nat. Herb. **4**: 96; Rydb. Bull. Torr. Bot. Club, **23**: 432.

Macoun, Cat. Can. Pl. 138 and 517.¹

ILLUSTRATIONS: Lehm. Rev. Pot. *pl. 6*. PLATE, *46, f. 6*; dissection of flower, *f. 7*; pistil, *f. 8*; stamen, *f. 9*; fruiting hypanthium and calyx, *f. 10*; basal leaf of the narrow leaved form, *f. 11*.

Low, 1–2 dm. high, ascending or spreading, generally with numerous subsimple appressed-strigose stems from the caudex. Stipules very large for the size of the plant, about 1 cm. long, broadly ovate, subentire and often obtuse. Basal leaves many, pinnate; leaflets 4–8 pairs, light green in color, appressed-strigose or glabrate, obovate-oblong in outline, deeply pinnatifid with oblong obtuse lobes, about .5 cm. long in the typical form, but in the more common form with nearly linear more acutish lobes, often three-quarters cm. long. Stem leaves reduced, the uppermost only 3-cleft. Flowers in few-flowered, rather open cymes, about 1 cm. in diameter. Hypanthium strigose. Sepals and bractlets lanceolate, long-acuminate, the latter about one-half the size of the sepals. Petals yellow, obovate, slightly retuse, longer than the sepals.

The type specimens of Nuttall have light green leaves with 4–8 pairs of oblong-cuneate leaflets, dissected into broadly oblong obtuse segments .5 cm. long, the stem more or less ascending. In the more common form, however, the segments are often .75 cm. long, nearly linear and often acute (*Plate 46, f. 11*), the stem more or less spreading and the flower-clusters very irregular. It may be a good variety.

All forms of *P. Plattensis* are characterized by the stipules, which are unusually large for the size of the plant. Its range is from Colorado and Utah to the Saskatchewan, but it belongs to the valleys of the high plains rather than to the alpine regions.

¹ Includes *P. pinnatisecta*.

94. *Potentilla Richardii* Lehm.

Potentilla Richardii Lehm. Ind. Sem. Hort. Bot. Hamb. **1849**: 6. 1849.

Lehm. Stirp. Pug. **9**: 1; Rev. Pot. 26; Hemsley, Biol. Cent. Am. **1**: 376; Walp. Ann. **2**: 471.

Potentilla ancistifolia Galeotti, Coll. Pl. Mex. No. 3078, fide Lehmann, *l. c.*

ILLUSTRATION: Lehm. Rev. Pot. *pl.* 5, *f.* 1.

Stems short, ascending or erect, few-flowered, hirsute, with spreading hairs. Basal leaves pinnate; leaflets about 3 pairs, hairy, with few spreading hairs, cuneate-flabelliform, incised or deeply 5-7-toothed at the end with broadly oblong teeth. Petals yellow, obcordate, nearly twice as long as the sepals.

Central Mexico: *J. Linden, No. 661 (Orizaba); *H. Galeotti, No. 3078.

95. *Potentilla Cascadensis*.

Stem erect or ascending from a perennial rootstock, simple, with 2-3 small leaves, slightly strigose or glabrate, strict. Stipules very large, broadly ovate, 10-15 mm. long, the lower ones brown and scarious and covering the ascending rootstock. Basal leaves pinnate; leaflets 3-6 pairs, slightly silky-strigose or in age glabrate, 1-2 cm. long, broadly cuneate to nearly orbicular in outline, deeply incised with ovate teeth at the apex. Stem leaves small, with 1-2 pairs of leaflets. Hypanthium silky-hirsute or strigose, in fruit about 1 cm. in diameter; bractlets oblong to oval, two-thirds the length of the broadly lanceolate acute sepals. Petals yellow, obcordate, about a fourth exceeding the sepals.

I have had much doubt as to whether this plant is or is not a valid species. It is intermediate between *P. Plattensis*, *Drummondii*, *multijuga* and *Breweri*. In leaf form and general habit it is nearest to *P. Breweri*, from which it differs in the kind of pubescence, viz., in *P. Cascadensis* silky and mostly appressed, in *P. Breweri* woolly. It differs from *P. Plattensis* in the broader and less lobed leaflets, the more upright and less leafly stem and larger flowers. It differs from *P. multijuga* in the small number of leaflets and the larger flowers; from *P. Drummondii* in the smaller size of the leaflets. The specimens examined are:

Washington: Suksdorf, No. 2165, 1892 (type; Chiquash Mts. of the Cascades).

California: J. G. Lemmon, No. 84, 1875, and Nos. 966 and 969, 1875 (Lassen's Peak).

British Columbia: Macoun, No. 7310, 1889.

96. *Potentilla Drummondii* Lehm.

Potentilla Drummondii Lehm. Stirp. Pug. **2**: 9. 1830.

Eat. Man. Ed. 7: 458; Torr. & Gray, Fl. N. Am. **1**: 439; Eat. & Wright, N. Am. Bot. 374.

Don, Gard. Diet. **2**: 558; Dietr. Syn. Pl. **3**: 187; Walp. Rep. **2**: 32; Ann. **2**: 481; Lehm. Rev. Pot. 66.

Hook. Fl. Bor. Am. **1**: 189; Rydb. Bull. Torr. Bot. Club, **23**: 434.

Potentilla dissecta Wats. Proc. Am. Acad. **8**: 550 (in part); Macoun, Cat. Can. Pl. 138 and 517 (in part).

Potentilla diversifolia Gray, Proc. Am. Acad. **8**: 381.

ILLUSTRATIONS: Hook. Fl. Bor. Am. *pl.* 65. PLATE 47, *f.* 1; dissection of flower, *f.* 2; pistil, *f.* 3; stamen, *f.* 4; fruiting hypanthium and calyx, *f.* 5.

Stem erect, 3–6 dm. high, slightly hairy, few-leaved, branched above. Stipules about 2 cm., ovate, lanceolate, acuminate, veined, subentire. Basal leaves with petioles 5–10 cm. long, slightly strigose, hairy, especially when young; leaflets 2–5 pairs, somewhat crowded, often verticillate and the upper confluent, veined, 2–6 cm. long, obovate-cuneate, deeply and sharply toothed with linear-oblong or lanceolate acute teeth. Stem leaves 1–5-foliolate, short-petioled or sessile. Flowers long-pedicelled. Hypanthium hirsute, veined; bractlets lanceolate, shorter than the ovate-lanceolate acuminate sepals. Petals 6–10 mm., obcordate, longer than the sepals. Stamens about 20.

Watson included this in *P. dissecta*. As he had only comparatively poor specimens, with few, more approximate leaflets, it was not strange that he did so, especially with his tendency to unite forms somewhat related. Had he seen such specimens as those collected by Suksdorf, or the one from which Lehmann's figure was drawn, I doubt if he had so referred it. Such well-developed specimens have pinnate leaves of 3–5 rather distant pairs of leaflets, very large stipules resembling those of *P. Plattensis* and a large hypanthium which is strongly hirsute. From *P. Plattensis* and the other species of the group it differs in the stoutness of the plant, and by the fewer (2–5 pairs) and larger leaflets, which are from 3 to 6 cm. long, and the acute teeth. It is a rare species. The only specimens seen are the following:

Washington: W. N. Suksdorf, No. 539, 1875; 1885; Nos. 741 and 2487, 1896.

Oregon: Elihu Hall, No. 135, 1871.

California: J. G. Lemmon, No. 1200, 1875.

British Columbia: John Macoun, No. 32, 1890.

Rocky Mountains of British America: E. Bourgeau, 1858.

97. *Potentilla multijuga* Lehm.

Potentilla multijuga Lehm. Ind. Sem. Hort. Bot. Handb. **1849**: 6. 1849.

Lehm. Stirp. Pug. **9**: 2; Rev. Pot. 29; Walp. Ann. **2**: 472; Rydb. Bull. Torr. Bot. Club, **23**: 434.

ILLUSTRATIONS; Lehm. Rev. Pot. *pl.* 7. PLATE 48, *f.* 1-2; dissection of flower, *f.* 3; stamen, *f.* 4; pistil, *f.* 5; fruiting hypanthium and calyx, *f.* 6.

Stem erect, 3-7 dm. high, slightly silky-strigose, more or less leafy. Stipules large, 1-2 cm. long, ovate, entire. Basal leaves numerous, often 2-3 dm. long, slightly hairy or glabrate, pinnate with 6-13 pairs of obovate cuneate leaflets 1-4 cm. long, which are coarsely toothed above the middle. Stem leaves smaller and with fewer leaflets. Cyme narrow with rather slender pedicels. Flowers about 15 mm. in diameter. Hypanthium slightly silky, in fruit about 1 cm. in diameter; bractlets oblong, about one-third shorter than the ovate sepals. Petals broadly obcordate, about one-third longer than the sepals. Stamens about 20. Pistils about 30; style nearly terminal, filiform, about twice as long as the achene.

This species has been lost for about 40 years. As in the collections of this country there were no specimens of a *Potentilla* whose leaves resembled those of Lehmann's plate, and as those of the latter resembled the leaves of *Horkelia cuneata*, most botanists have cited *P. multijuga* as a synonym of that species, and Professor Greene, in *Flora Franciscana*, has even adopted the name. It is not very likely that such an acute observer and eminent botanist as Dr. Lehmann would have figured a *Horkelia* with true *Potentilla* flowers. In two collections, viz., those of the National Herbarium and the herbarium of Harvard University, I have found a *Potentilla* that answers Lehmann's description and plate, except that the plant is more robust and the leaflets are larger, and more irregular in form and position.

California: Dr. H. E. Hasse, 1890 (Los Angeles).

P. multijuga much resembles *P. Plattensis*, but the leaflets are more numerous, 6-13 pairs, obovate-cuneate and toothed only toward the apex, and the sepals broader, ovate and abruptly contracted at the apex. The leaflets in Lehmann's figure are about 2 cm. long; some in Dr. Hasse's specimens are nearly 5 cm. Lehmann's figure illustrates an undeveloped specimen about 2.5 dm. high. Some of the better developed specimens are 7.5 dm. high, with leaves 3 dm. long.

§ 19. ARENICOLAE.

98. *Potentilla Newberryi* Gray.

Ivesia gracilis Torr. & Gray in Newberry, Pac. R. R. Rep. 6: part 3, 72. 1857.

Brewer & Wats. Bot. Cal. 1: 184.

Potentilla Newberryi Gray, Proc. Am. Acad. 6: 532. 1865.

Greene, Pittonia, 1: 105.

ILLUSTRATIONS: Pac. R. R. Rep. 6: *pl.* 11. PLATE 49, *f.* 1-2; dissection of flower, *f.* 3; pistil, *f.* 4; stamens, *f.* 5; fruiting hypanthium and calyx, *f.* 6.

Annual, 2-4 dm. high, slightly silky-villous, leafy, but stem leaves rather small. Stipules linear. Basal leaves pinnate, with 5-10 pairs of slightly silky-villous leaflets divided to near the base into 3-5 oblong-spatulate or linear segments. Stem leaves similar, but with 2-4 pairs of less divided leaflets. Cyme diffuse, with slender pedicels which are at last drooping, but not abruptly reflexed just below the hypanthium. Hypanthium villous, about 5 mm. in diameter. Bractlets and sepals ovate-lanceolate, sub-equal. Petals white, obovate, exceeding the sepals. Stamens 20. Pistils numerous; style slender, but glandular and somewhat thickened below.

This species was described as *Ivesia* in 1857, transferred to *Potentilla* in 1865, then returned to *Ivesia* in 1876, and lastly again placed in *Potentilla* in 1887, together with the other *Ivesiæ*. Whatever may be the fate of that genus this species should remain a *Potentilla*, as it lacks every character that distinguishes *Ivesia* from *Potentilla*. I have placed it nearest to the *Multijugæ*, as it shows most relationship to that group. The following specimens belong here:

California or *Oregon*: Newberry (Williamson Exp.), 1855 (Rhett Lake).

Oregon: Coville & Leiberg, No. 1, 1896; Leiberg, No. 2386, 1896.

Potentilla Newberryi arenicola.

ILLUSTRATION: PLATE 45, *f.* 1.

Stems many from the caudex, prostrate or spreading. Leaflets fewer, 3-6 pairs. Flowers somewhat larger.

It grows in sandy places.

Washington: Thos. Howell, 1896 (Wallula).

Oregon: Leiberg, No. 382, 1894.

§ 20. LEUCOPHYLLÆ.

99. *Potentilla Hippiana* Lehm.

Potentilla leucophylla Torr. Ann. Lye. Nat. Hist. N. Y. 2: 197. 1827. Not Pall.

Potentilla Hippiana Lehm. Stirp. Pug. 2: 7. 1830.

Don, Gard. Dict. 2: 558; Walp. Ann. 2: 480; Lehm. Rev. Pot. 62.

Wats. Proc. Am. Acad. 8: 555; Porter and Coult. Syn. Fl. Col. 36; Rothrock, Wheeler's Exp. 6: 112; Coulter, Man. Rocky Mts. 84; Wats. & Coult. in Gray, Man. Ed. 6: 159; Rose, Cont. U. S. Nat. Herb. 1: 120; Rydberg, *ibid.* 3: 496; Rydb. Fl. Neb. 21: 16; Bull. Torr. Bot. Club, 24: 2; Britt. & Brown, Ill. Fl. 2: 213.

Lehm.; Hook. Fl. Bor. Am. 1: 188; Macoun, Cat. Can. Pl. 137.

Potentilla dealbata Dougl.; Hook. Fl. Bor. Am. 1: 188. As synonym. 1833.

Potentilla leucophylla Eat. Man. Ed. 5: 344. 1829.

Eat. Man. Ed. 6: 281; Ed. 7: 458; Eat. & Wr. N. Am. Bot. 373.

Potentilla Pennsylvanicum Hippiana Torr. & Gray, Fl. N. Am. 1: 438. 1841.

Dietr. Syn. Pl. 3: 186; Walp. Rep. 2: 32.

Gray, Proc. Acad. Phil. 1863: 61; Torr. Pac. R. R. Rep. 5: No. 4: 84; Porter, U. S. Geol. Surv. 1870: 475.

ILLUSTRATIONS: Hook. Fl. Bor. Am. *pl.* 64; Britt. & Brown, Ill. Fl. 2: *f.* 1927, PLATE 50, *f.* 1; dissection of flower, *f.* 2; pistil, *f.* 3; stamen, *f.* 4; fruiting hypanthium and calyx, *f.* 5.

Stem erect, 3–5 dm. high, more or less silky canescent or white with appressed hairs, leafy, dichotomously branched above, the branches generally erect. Stipules 1–2 cm. long, ovate-lanceolate, acuminate, subentire. Basal leaves several, the petioles about 5 cm. long; leaflets 3–5 pairs. Stem leaves generally several, short-petioled, 7–3-foliate, all white or grayish silky on both sides and tomentose beneath; leaflets gradually diminishing downward, obovate or cuneate-oblong, 2–5 cm. long, deeply obtusely toothed, venose beneath, sometimes a little decurrent on the rachis, the upper often confluent, margins not revolute. Bractlets lanceolate, generally narrower than the sepals, but often nearly equalling them in length, acute. Sepals ovate-lanceolate, 5–7 mm. long, acute. Petals 6–8 mm. long, a little exceeding the calyx, obovate, retuse. Stamens about 20.

The name used by Eaton seems to have been overlooked altogether. It may be claimed that *leucophylla* is only a misprint for *leucophylla*, the original name, which, however, is antedated by *P. leucophylla* Pallas, a synonym of *P. nivea*. The name *P. leucophylla*, which means woolly-leaved, and is very appropriate, is not only found in the fifth edition of Eaton's Manual, but also in the sixth and seventh editions, and in Eaton & Wright's North American Botany. Watson in his Bibliographical Index gives no reference to any of the editions of Eaton's Manual and cites Eaton & Wright as a reference under *P. leucophylla*, which does not appear there. The Kew Index has also omitted *P. leucophylla*, which should take the place of *P. Hippiana*, being a year older, if it were not for the fact that it very likely is to be explained as a misprint. *P. Hippiana* is sometimes very hard to distinguish from *P. effusa*, and the two seem to grade into each other. *P. Hippiana* is, however, as a rule larger, silky as well as tomentose; the branches are more erect and the bractlets nearly equal the acute sepals. The species grows on the plains and the foothills of the Rockies, but generally in richer soil than *P. effusa*. It extends from New Mexico and Arizona to Minnesota and Saskatchewan.

Potentilla Hippiana propinqua Rydb.

Potentilla Hippiana diffusa Lehm. Ind. Sem. Hort. Bot. Hamb. **1849**: 8.

Rev. Pot. 62; Walp. Ann. **2**: 480.

Rydb. Cont. U. S. Nat. Herb. **3**: 497. 1896.

Potentilla diffusa Gray, Mem. Am. Acad. **1849**: 41. 1849. Not Willd.

Torr. Sitgreave's Rep. 159, 1853.

Potentilla Hippiana pulcherrima Wats. Cont. Am. Acad. **8**: 555. In part. 1873.

Coulter, Man. Rocky Mts. 84 (in part); Aven Nelson, Wy. Exp. Sta. Bull. **28**: 103 (in part).

Potentilla Hippiana propinqua Rydb. Bull. Torr. Bot. Club, **24**: 3. 1897.

The stem is more diffuse or ascending, rather low; the leaflets are more approximate and more silky, scarcely at all tomentose, often green above, when they somewhat resemble those of *P. pulcherrima*, which is a much taller plant. This has the same range as the species.

100. Potentilla effusa Dougl.

Potentilla effusa Dougl.; Lehm. Stirp. Pug. **2**: 8. 1830.

Don, Gard. Dict. **2**: 557; Dietr. Syn. Pl. **3**: 186; Walp. Rep. **2**: 32; Ann. **2**: 480; Lehm. Rev. Pot. 64.

Eat. Man. Ed. 7: 458; Torr. & Gray, Fl. N. Am. **1**: 437; Eat. & Wr. N. Am. Bot. 374; Hook. Journ. Bot. **6**: 219; Wats. Proc. Am. Acad. **8**: 555; Porter & Coult. Syn. Fl. Colo. 36; Coulter, Man. Rocky Mts. 84; Wats. & Coult. in Gray, Man. Ed. 6: 159; Rydb. Bull. Torr. Bot. Club, **24**: 2; Britt & Brown, Ill. Fl. **2**: 214.

Lehm. in Hook. Fl. Bor. Am. **1**: 187; Macoun, Cat. Can. Pl. 138 and 517.

ILLUSTRATIONS: Lehm. Rev. Pot. *pl.* 22; Britt. & Brown, Ill. Fl. **2**: *f.* 1928. PLATE 41, *f.* 3; dissection of flower, *f.* 4.

Stems many from the root, 2–4 dm. high, more slender than in the preceding, slightly silky, ascending or diffuse, dichotomously paniculately branched with more spreading branches; stipules lanceolate, subentire. Basal leaves many with slender petioles 2–5 cm. long, generally interrupted pinnate with 2–5 pairs of leaflets. Stem leaves often 1–3-foliate, grayish tomentose on both sides; leaflets cuneate-oblong, the upper often confluent, crenate with broad generally ovate teeth. Flowers paniculate-cymose. Bractlets linear or linear-lanceolate, generally much shorter than the lanceolate acuminate sepals. Petals obovate, retuse, a little longer than the calyx. Stamens 20. Pistils 20–40.

The pubescence is grayish or whitish tomentose, not at all silky; the branches are rather divergent and the bractlets much smaller than the acuminate sepals. It grows on

the dry plains from New Mexico to Montana, Assiniboia (and Minnesota?). Some specimens seem to unite this species with the next.

Potentilla effusa gossypina Nutt.; Torr & Gray, Fl. N. Am. **1**: 437, 1849, is still unknown. Dr. Hooker, in London Jour. Bot. **6**: 219, states that the plant collected by Geyer (No. 637) was labelled by Nuttall *P. gossypina*. These specimens Dr. Hooker identified as *P. arachnoidéa* Douglas, which is *P. Pennsylvanica arachnoidéa* Lehm. There is no specimen in Nuttall's herbarium at the Academy of Natural Sciences of Philadelphia, nor in the Torrey or the Gray herbaria.

101. *Potentilla Coloradensis*.

ILLUSTRATIONS: PLATE 52, *f. 1*; fruiting hypanthium and calyx, *f. 2*; dissection of flower, *f. 3*; pistil, *f. 4*.

Stems several from the perennial caudex, rather slender, silky tomentose, in age glabrate, about 3 dm. high, branched. Lower stipules scarious and brown, covering the caudex, the upper lanceolate, entire. Basal leaves interruptedly and irregularly pinnate; leaflets 4–6 pairs, finely tomentose, or in age glabrate. Stem leaves mostly ternate, or the upper simple; leaflets cuneate, incisely serrate with triangular acute teeth. Cyme branched with ascending branches. Hypanthium tomentose, in fruit 4–5 mm. in diameter; bractlets linear-lanceolate, scarcely half as long as the narrowly lanceolate acuminate sepals. Petals obcordate, scarcely exceeding the sepals. Stamens about 20. Pistils 10–20.

This species has been confused with *P. effusa*, but differs in the more erect, more slender stems, the finer pubescence, the triangular teeth of the leaves and the fewer pistils. The following specimens have been examined.

Colorado: T. C. Porter, 1872 (South Park); H. N. Patterson, No. 27, 1885 (Georgetown); H. G. French, 1874 (Boulder); Pammel, 1896; C. F. Baker, No. 10, 1896; Rydberg, 1895; G. E. Osterhout, 1893.

Wyoming: A. Nelson, Nos. 1368 and 2017, 1895.

102. *Potentilla Breweri* Wats.

Potentilla Breweri Wats. Proc. Am. Acad. **8**: 555. 1873.

Bot. Cal. **1**: 178; Rattan, An. Key W. Coast Bot. 51; Greene, Fl. Fran. **1**: 64; Coville, Cont. U. S. Nat. Herb. **4**: 95; Rydb. Bull. Torr. Bot. Club, **24**: 1.

Stems several from the rootstock, erect-ascending, 1–2.5 dm. high, tomentose, few-leaved. Stipules ovate, the lower membranous, brownish and entire, the upper broad,

entire or incised. Leaves with short petioles, densely white silky-villous; leaflets crowded and often somewhat verticillate, about 1 cm. long, broadly cuneate and deeply cut-toothed. Inflorescence dense in the typical form; flowers 1.5 cm. in diameter. Hypanthium silky-villous; bractlets oblong, generally much shorter than the triangular-ovate acute sepals. Petals obcordate, 6–10 mm. long, exceeding the calyx.

Potentilla Breweri much resembles *P. Plattensis*. It has the large stipules characteristic of that species and also essentially the same flowers. The leaflets are, however, broader and less divided and densely silky-villous. In the typical form the cyme is rather dense and the flowers larger.

California: Bolander, No. 5084, 1866; 1872; W. H. Brewer, Nos. 1708 and 1720, 1863; Bolander & Kellogg, 1872; Baker & Nutting, 1894; Brandegee, 1892; A. Kellogg, 1876; J. W. Congdon, 1890.

***Potentilla Breweri expansa* Wats.**

Potentilla Breweri expansa Wats. Bot. Cal. **1**: 179. 1876.

Rydb. Bull. Torr. Bot. Club, **24**: 1.

Potentilla Plattensis leucophylla Greene, Erythea, **1**: 4. 1893.

ILLUSTRATIONS: PLATE 52, *f. 1*; dissection of flower, *f. 2*; pistil, *f. 3*; stamen, *f. 4*; fruiting hypanthium and calyx, *f. 5*.

Stems slender, decumbent or ascending; flowers smaller, on slender pedicels; leaves less villous, especially above; petals about 5 mm. long.

This resembles *P. Plattensis* still more, having the open cyme of that species. It is apparently more common than the species.

California: J. G. Lemmon, Nos. 64 and 712, 1874; No. 85, 1875; C. F. S. Sonme, No. 351, 1888; 1892 (*P. Plattensis leucophylla* Greene); Coville & Funston, Nos. 1750, 1531 and 2117, 1891; M. E. Jones, No. 351A, 1881.

Nevada: S. Watson, No. 332, 1868 (in part).

103. *Potentilla ambigens* Greene.

Potentilla ambigens Greene, Erythea, **1**: 4. 1893.

Rydb. Bull. Torr. Bot. Club, **24**: 3. 1897.

ILLUSTRATIONS: PLATE 53, *f. 1*; dissection of flower, *f. 2*; pistil, *f. 3*; stamens, *f. 4–5*; fruiting hypanthium and calyx, *f. 6*.

Stem stout, 6–7 dm. high, more or less striate, densely silky-villous with long spreading hairs, branched above. Stipules large, those of the basal leaves ovate-oblong, subentire, 2–4 cm. long, more or less membranous and brownish, those of the stem

ovate, acuminate, green and more or less toothed with lanceolate teeth. Basal leaves with petioles 10–20 cm. long, irregularly pinnate, silky-villous beneath, especially when young and on the rachis and the veins, more glabrous above; leaflets 4–7 pairs, obovate-oblong, 3–6 cm. long, coarsely serrate, more or less decurrent on the rachis, especially the uppermost, which often are confluent. Stem leaves similar but short-petioled and with fewer leaflets. Bractlets lanceolate, equalling or sometimes even exceeding the sepals. Petals about 8 mm., obcordate, about a fourth longer than the sepals. Stamens 25.

It is strange that this strongly marked species should not have been described before 1893. It was collected by Hall and Harbour in 1862, Wm. A. Bell in 1867, and G. R. Vasey in 1881. The first specimens were included by Dr. Gray in *P. Hippiana*. On the label of Bell's specimen is written: "Durand suggests *P. rivularis*. Gray says no!—perhaps *P. campestris*." One of Vasey's specimens is labeled *Potentilla Thurberi*.

P. ambigua is the tallest of the group, 6–7 dm. high, rather sparingly grayish silky. The leaflets are 3–4 cm. long, coarsely serrate and more or less decurrent on the rachis. The following specimens have been examined:

Colorado: Hall & Harbour, nos. 158 and 162, 1862 (both only in part); E. L. Greene; Osterhout, 1893.

New Mexico: Wm. A. Bell (Ratan Mountains), 1867; G. R. Vasey (Las Vegas), 1867 1881; E. O. Wooten, no. 468, 1897 (White Mountains).

104. *Potentilla crinita* Gray.

Potentilla crinita Gray, Mem. Am. Acad. 1849: 41. 1849.

Lehm. Rev. Pot. 63; Walp. Ann. 2: 480.

Wats. Proc. Am. Acad. 8: 555; Coult. Man. Rocky Mts. 84; Rydb. Bull. Torr. Bot. Club, 24: 1.

ILLUSTRATIONS: Lehm. Rev. Pot. *pl.* 21. PLATE 54, *f.* 1; dissection of flower, *f.* 2; pistil, *f.* 3; stamen, *f.* 4; fruiting hypanthium and calyx, *f.* 5.

Stems several from the rootstock, ascending, 2–3 dm., few-leaved, diffusely few-branched, silky-pilose. Stipules 1–2 cm. long, ovate-lanceolate, acuminate, subentire. Basal leaves many, short-petioled, pinnate, silky-villous (pubescence projecting long outside the tips of the leaves), nearly smooth on the upper surface; leaflets 5–7 approximate pairs, cuneate, 1.5–2 cm. long, toothed at the apex, generally remaining conduplicate. Stem leaves few, small, only 1 or 2 pairs. Bractlets lanceolate, acute, a little shorter than the ovate-lanceolate acute sepals. Petals obovate, deeply retuse, exceeding the calyx.

This is similar in habit to *P. Breweri*, but distinguished by its conduplicate, appressed-

silky cuneate leaflets, which are slightly crenate at the apex. *P. crinita* grows on the dry plains of Arizona, New Mexico, southern Utah and Colorado.

Arizona: Wm. Thompson, No. 20, 1872; J. G. Lemmon and wife, 1884; Munson & Hopkins, 1889; M. E. Jones, No. 3949, 1884; Edw. Palmer, No. 482, 1890; L. F. Anderson, 1869.

New Mexico: A. Fendler, No. 199, 1847 (type); Alice Eastwood, 1892.

Colorado: Brandegees, No. 1183, 1875.

Utah: M. E. Jones, No. 6004, 1894; Mrs. E. P. Thompson.

105. *Potentilla Lemmoni* (Wats.) Greene.

Ivesia Lemmoni Wats. Proc. Am. Acad. **20**: 365. 1885.

Potentilla Lemmoni Greene, Pittonia, **1**: 104. 1887.

Rydb. Bull. Torr. Bot. Club, **24**: 4.

ILLUSTRATIONS: PLATE 55, *f. 1*; dissection of flower, *f. 2*; stamen, *f. 3*; pistil, *f. 4*; fruiting hypanthium and calyx, *f. 5*.

Caudex branched. Stems 3-4 dm. high, branched, slender but strict, more or less tinged with brown, slightly silky-strigose. Upper stipules ovate-lanceolate, entire, 5-10 mm. long, the lower brown, scarious and 15 mm. long. Basal leaves several, pinnate, grayish appressed-silky; leaflets 3-5 pairs, 1-2 cm. long, of rather firm texture, oblong, entire or 3-toothed at the apex, or with a few additional small teeth above the middle. Cyme branched, open, with slender pedicels. Hypanthium finely strigose, cupulate, in fruit 3-4 mm. in diameter; bractlets linear, about half as long as the lanceolate acuminate sepals. Petals yellow, obovate, about equalling the sepals in length.

This species should, I think, be placed as an appendix to this group. It has no relationship to any of the *Ivesias*, and is a true *Potentilla* in every respect, except as to the number of pistils, which are only half a dozen or so. Its nearest relative is, without doubt, *Potentilla crinita*, from which it differs by the longer, narrower and fewer leaflets, the sparser pubescence, the few pistils and the longer hairs on the receptacle.

New Mexico: Lemmon.

§ 21. CANDICANTES.

106. *Potentilla candicans* Humb. & Bonpl.

Potentilla candicans Humb. & Bonpl.; Nestler, Mon. Pot. 23 and 34. 1816.

Lehm. Mon. 22 and 67; H. B. K. Nov. Gen. & Sp. **6**: 216; Poir. Supp. **4**: 542; Ser. in DC. Prod. **2**: 582; Spreng. Syst. Veg. **2**: 535; Presl, Epim. Bot. 198; Schlecht. Linnaea, **5**: 572; Lehm. Rev. 31;

Hemsley, Biol. Cent. Am. **1**: 375; Don, Gard. Diet. **2**: 559; Dietr. Syn. Pl. **3**: 89; Walp. Ann. **2**: 472.

Potentilla lineariloba Ser. in DC. Prodr. **2**: 582. 1825.

Lehm. Rev. Pot. 31; Don, Gard. Diet. **2**: 560; Dietr. Syn. Pl. **3**: 189; Walp. Ann. **2**: 472.

Potentilla candicans nana Humb. & Bonpl.; Nestler, Mon. Pot. 34. 1816.

Ser. in DC. Prodr. **2**: 582; Lehm. Mon. 67; Rev. Pot. 31; Don, Gard. Diet. **2**: 559; Walp. Ann. **2**: 472.

Potentilla Humboldtiana Tratt. Ros. Mon. **4**: 41.

Perennial from a thick ligneous root and short caudex; stem from .5 to 3 dm. high with few reduced leaves, more or less white-silky. Basal leaves numerous, silvery-white, pinnate, with 6-10 pairs of deeply dissected leaflets; segments narrowly linear and more or less revolute. Bractlets oblong, about half as long as the ovate or broadly lanceolate sepals. Petals yellow, broadly obovate, a little exceeding the sepals. Style filiform.

The variety *nana* is only a depauperate form. The plant grows in mountain meadows of Central Mexico.

State of Mexico: C. G. Pringle, No. 2923, 1889; No. 4176, 1896; F. Müller, No. 617, 1853; *Humboldt & Bonpland; *Coulter, No. 69; *Galeotti, No. 563; Schiede; E. W. Nelson, No. 197, 1894.

Potentilla candicans crocea Lehm.

Potentilla candicans crocea Lehm. Rev. Pot. 32. 1868.

Flowers orange.

Mexico: Scheide, No. 585.

2. HORKELIA Cham. & Schlecht.

Horkelia Cham. & Schlecht. Linnaea, **2**: 26. 1827.

Sibbaldia Sprengel, Syst. **4**: part 2, 341. In part. 1827.

Ivesia Torr. & Gray, Pac. R. R. Rep. **6**: 72. 1857.

Hypanthium deeply campanulate to saucer-shaped. Bractlets, sepals and petals 5. Petals of variable form, strap-shaped, oblanceolate, obovate, cuneate or obovate, often unguiculate, white or light yellow. Stamens 5-20, inserted in the throat of the hypanthium and therefore separated from the receptacle by a wide open space; filaments in *Euhorkelia* and *Horkeliella* dilated and petaloid, persistent, triangular or lanceolate with a distinct midrib, in *Ivesia* filiform. Receptacle in the first two subgenera generally conic or hemispheric with numerous pistils, in the last mostly small or obsolete with 3-15 pistils surrounded by a ring of prominent bristles. Styles long and slender, almost filiform, but generally slightly thickened and somewhat glandular below, articu-

lated to the achene and at last deciduous. Ovule and seed inserted near the base of the style, pendulous and anatropous.

The genus consists of about 50 species, all natives of western North America. They are all perennials, with a thick woody caudex or rootstock covered with brown scales. The leaves are always pinnate and generally with rather numerous leaflets. In *Ivesia* they are usually crowded and more or less overlapping. In *H. pygmaea*, *H. Shockleyi*, *H. Baileyi* and *H. saxosa*, the flowers much resembles those of *Sibbaldias*, from which these species are easily distinguished by their terminal style and pinnate leaves. The last species apparently forms a transition to *Potentilla*.

KEY TO THE GROUPS.

Filaments dilated, petaloid.

Stamens 10.

Sub-genus EUTHORKELIA.

Lower stipules not dissected into linear filiform segments.

Cyme very leafy; hypanthium campanulate;¹ bractlets ovate, much exceeding the sepals and petals. 1. *Californicae*.

Cyme less leafy; calyx cupulate or saucer-shaped;¹ bractlets not exceeding the sepals.

Leaves with 4-15 pairs of toothed or dissected leaflets.

Inflorescence truly cymose; filaments uniform.

Cyme many- or several-flowered; bractlets ovate or lanceolate; leaflets not crowded. 2. *Cuneatae*.

Cyme few-flowered; bractlets linear; leaflets crowded and imbricated, silvery white. 6. *Sericatae*.

Cyme sub-capitate or fastigate-corymbose; outer filaments triangular, inner ones oblong-lanceolate; bractlets linear. 3. *Capitatae*.

Leaves of 2-4 pairs of leaflets, which are 2-3-(seldom 5-) toothed only at the apex. 4. *Tridentatae*.

Lower stipules dissected into linear-filiform hairy segments. 5. *Hirsutae*.

Stamens 20.

Pistils numerous; hypanthium campanulate; sepals reflected in anthesis.

Subgenus HORKELIELLA.

Pistils 3-6; hypanthium turbinate.

(*H. argyrocoma* in IVESE.)

Filaments filiform.

Subgenus IVESIA.

Leaflets numerous, more or less crowded, often imbricated, generally divided to near the base.

Stem leafy (less so in *I. campestris*); stamens 15-20.

Cyme corymbiform or subcapitate; petals obovate with a long claw. 8. *Unguiculatae*.

Cyme generally open with lax branches; petals with very short claw if any, white. 9. *Eremicae*.

¹ In the description of the hypanthium in this genus the term *campanulate* is used when the depth equals or exceeds the diameter; *cupulate* or cup-shaped when it equals about one-half of the diameter; *saucer-shaped* when it is equal to one-third of the diameter or less; *wheel-shaped* when it is flat or nearly so.

- Stem few-leaved or scapiform; stamens 5–10.
 Leaflets comparatively few, broadly obovate to reniform-flabelliform, merely coarsely toothed or incised.

10. *Lycopodioides*.11. *Saxosac*.

Subgenus EUHORKELIA.

§ 1. CALIFORNICAE.

Stout and glandular leafy plants with comparatively large leaflets. Flowers in a leafy cyme. Hypanthium deeply campanulate; bractlets ovate, much exceeding the sepals and petals. Petals narrow, strap-shaped, white. Stamens 10, with rather long anthers and short oblong comparatively narrow filaments.

Bractlets generally 3-toothed; stem stout.

Basal leaves with 3–4 pairs of leaflets; fruiting calyx 5–6 mm. in diameter. 1. *H. frondosa*.

Basal leaves with 4–10 pairs of leaflets; fruiting calyx about 1 cm. in diameter. 2. *H. Californica*.

Bractlets generally entire; stem slender.

3. *H. elata*.

§ 2. CUNEATAE.

Stem less leafy. Basal leaves pinnate, with 4–15 pairs of rather small obovate or cuneate leaflets in all but one species less than 2 cm. long. Inflorescence rather openly cymose, several- or many-flowered. Hypanthium cupulate or saucer-shaped; bractlets ovate or lanceolate, not exceeding the sepals. Stamens 10, with broader uniform filaments. Pistils numerous.

Leaflets flabelliform, dissected.

4. *H. Micheneri*.

Leaflets merely toothed.

Pubescence dense, silky, not at all glandular (rarely slightly glandular on the branches of the cyme and on the hypanthium in *H. Clevelandii*).

Pubescence very short and dense.

Plant stout, 3–6 dm. high; leaflets thick, obovate, 10–25 mm. long. 5. *H. sericea*.

Plant slender, 2–4 dm. high; leaflets obovate-cuneate to reniform, 5–10 mm. long.

6. *H. Clevelandii*.

Pubescence longer and less dense; plants 2–4 dm. high.

Pubescence appressed; calyx cupulate.

7. *H. Parryi*.

Pubescence spreading; calyx nearly saucer-shaped.

8. *H. Bolanderi*.

Pubescence more or less hirsute and glandular.

Plants generally over 3 dm. high; petals spatulate or oblong.

Flowers 15–20 mm. in diameter; hypanthium saucer-shaped; pedicels often 2.5 cm. long.

9. *H. platycalyx*.

Flowers about 10 mm. in diameter; hypanthium cupulate; pedicels .5–1.5 cm. long.

10. *H. puberula*.

Plants generally less than 3 dm. high.

Hypanthium cupulate ; petals spatulate-oblong.

11. *H. cuneata*.

Hypanthium saucer-shaped; petals broadly obovate.

12. *H. platypetala*.

§ 3. CAPITATAE.

In general habit resembling the preceding group, but the inflorescence more contracted, fastigiate corymbose-cymose or subcapitate. Hypanthium deeply cup-shaped; bractlets linear. Filaments of the outer stamens much broader than those of the inner ones, broadly triangular. Pistils numerous. Petals, except in Nos. 13 and 19, obovate, unguiculate, white, or often tinged with rose.

Leaflets merely toothed (except sometimes in the first species).

Plants less than 2 dm. high ; cyme fastigate-corymbose ; pubescence dense.

Pubescence densely silky-canescens.

13. *H. Hendersonii*.

Pubescence densely glandular puberulent.

14. *H. parviflora*.

Plants generally over 2 dm. high.

Pubescence of both leaves and stem more or less villous.

15. *H. pseudocapitata*.

Pubescence rather scant, on the leaves scarcely any, on the upper part of the stem glandular.

Leaflets obovate or oval, 2-3 cm. long ; bracts generally exceeding the inflorescence.

16. *H. capitata*.

Leaflets obovate or cuneate, .75-2 cm. long ; bracts shorter than the inflorescence.

17. *H. fusca*.

Leaflets divided more than half way to the midvein into linear or linear-oblong segments.

Stem glandular above; petals cuneate, emarginate.

18. *H. tenella*.

Stem hirsute-villous, not glandular ; petals oblong.

19. *H. tenuiloba*.

§ 4. TRIDENTATAE.

Stems slender and ascending ; leaves pinnate with 2-4 pairs of cuneate leaflets, which are 2-3- (seldom 5-) toothed at the apex. Hypanthium cupulate or campanulate. Petals oblanceolate or spatulate, unguiculate, white or yellowish. Stamens 10; filaments often linear-lanceolate. Pistils few, 5-15.

The group approaches *Ivesia* in several characters, viz., the narrow filaments, few pistils and the form of the petals. It is, however very nearly related to the following one, with which *H. congesta* connects it ; in that species the lower stipules are occasionally pinnately dissected.

Petals white, oblanceolate ; filaments linear-lanceolate ; cyme rather fastigiate. 20. *H. tridentata*.

Petals yellowish, at least in dry specimens.

Cyme subcapitate ; outer filaments triangular to lanceolate.

21. *H. flavesens*.

Cyme few-flowered and open; filaments all linear-lanceolate.

22. *H. congesta*.

§ 5. **HIRSUTAE.**

Resembling somewhat the preceding group, but with more numerous and often dissected leaflets, broader filaments, and lower stipules which are once or twice pinnately dissected into linear or filiform hairy segments.

Cyme fastigiately corymbose.

Leaves oblong-cuneate, 2-5-toothed at the apex.

Plant silky; leaflets about 4 pairs.

[22. *H. congesta*.]

Plant hirsute; leaflets 4-10 pairs.

23. *H. hirsuta*.

Leaflets divided to near the base into linear segments.

Stem more or less glandular; segments linear, acute, 1-2 mm. wide. 24. *H. daucifolia*.

Stem silky-villous, not glandular; segments narrowly linear, less than 1 mm. wide.

25. *H. caruifolia*.

Cyme open and lax.

Leaflets cuneate, cleft half their length at the apex into oblong-acute segments.

26. *H. laxiflora*.

Leaflets divided to the base into oblong or oval segments.

27. *H. Howellii*.

§ 6. **SERICATAE.**

This group contains a single species somewhat resembling the last one of the preceding group, but the stipules are not dissected. Cyme lax and few-flowered. Leaflets densely white-silky, crowded as in most *Ivesiae*.

One species.

28. *H. sericata*.

Subgenus **HORKELIELLA.**§ 7. **PURPURASCENTES.**

Stem slender, erect and strict, cyme open. Leaflets very numerous, over 20 pairs. Hypanthium campanulate; sepals reflexed in anthesis. Petals strap-shaped. Stamens 20, in three series, the inner (antipetalous) ones the shortest; filaments all lanceolate. Pistils rather numerous.

In the numerous leaflets and the 20 stamens the group approaches *Ivesia*, but the floral structures are otherwise exactly as in *Horkelia*, especially the *Californicae* group.

Plant 3-4 dm. high, smooth; leaflets 5-8 mm. long.

29. *H. pinctorum*.

Plant 1-2 dm. high, densely pubescent; leaflets 2-3 mm. long.

30. *H. purpurascens*.

Subgenus IVESIA.

§ 8. UNGUICULATAE.

Stems rather many from the caudex, rather leafy and many-flowered. Flowers in a more or less contracted corymbiform or subcapitate cyme. Hypanthium turbinate or campanulate. Petals obovate with an evident claw. Stamens 15–20, in *H. argyrocoma* with slightly dilated filaments. Plant more or less silky hairy, not glandular, and with numerous leaflets.

Whole plant silvery white; leaf-segments oblong; stamens 20.

Filaments somewhat dilated; flowers in small subcapitate clusters.

31. *H. argyrocoma*.

Filaments not dilated; cyme corymbose.

Petals white.

32. *H. sericoleuca*.

Petals yellow.

33. *H. Pickeringii*.

Plant somewhat silky, but not silvery white.

Stems erect or ascending; leaflets 5–10 mm. long; stamens 15.

34. *H. unguiculata*.

Stems decumbent; leaflets less than 5 cm. long; stamens 20.

35. *H. campestris*.

§ 9. EREMICAE.

Stems many from the caudex, decumbent or ascending, leafy. Flower-clusters open, with lax branches. Hypanthium hemispheric. Petals broadly obovate or nearly orbicular, white, almost destitute of claw. Stamens 20. Plants glabrous, or slightly appressed-hirsute, with numerous leaflets.

Leaflets generally simple, 2-ranked, more or less appressed-hirsute.

36. *H. eremica*.

Leaflets generally divided, perfectly glabrous.

37. *H. Kingii*.

§ 10. LYCOPODIOIDES.

Low and caespitose plants with a very thick caudex and short, few-leaved and subscapiform stems. Hypanthium hemispheric or saucer-shaped, in *H. Gordonii* campanulate. Petals generally cuneate or oblanceolate, mostly with a claw. Stamens 5 or 10. Plants silky, glandular or glabrate. Leaflets, except in *H. Webberi*, very numerous, very small and closely imbricated.

Leaflets not bristle-tipped.

Leaves densely white-silky, appearing wormlike from the very small numerous imbricated leaflets.

38. *H. Muirii*.

- Leaves green, but slightly silky ; leaflets 8–10 pairs, 1–2 cm. long. 39. *H. Webberi*.
 Leaves glandular-pubescent or glabrate.
 Cyme corymbose ; hypanthium cupulate.
 Bractlets linear ; petals spatulate. 40. *H. Utahensis*.
 Bractlets oblong.
 Leaves pubescent ; petals broadly obovate. 41. *H. scandularis*.
 Leaves glabrous ; petals oblanceolate. 42. *H. lycopodioides*.
 Cyme subcapitate ; hypanthium campanulate. 43. *H. Gordonii*.
 Leaflets mostly bristle-pointed.
 Cyme subcapitate ; hypanthium about 4 mm. in diameter. 44. *H. pygmaea*.
 Cyme corymbiform ; hypanthium about 3 mm. in diameter. 45. *H. Shockleyi*.

§ II. SAXOSAE.

Stems several from the caudex, rather leafy, with open rather few-flowered cymes. Hypanthium saucer-shaped. Petals obovate or oblanceolate, clawed. Stamens 5–30. Leaves with comparatively few leaflets, which are broadly obovate to reniform-flabelliform, coarsely toothed or incised.

- Leaflets obovate or orbicular ; stamens 5–10. 46. *H. Baileyi*.
 Leaflets reniform-flabelliform ; stamens 20–30. 47. *H. saxosa*.

§ I. CALIFORNICAE.

I. *Horkelia frondosa* (Greene) Rydb.

Potentilla frondosa Greene, Pittonia, **1** : 300. 1889.

Greene, Flora Fran. **1** : 66 ; Man. Bay Reg. Bot. 116.

Horkelia frondosa Rydberg, Bull. Torr. Bot. Club, **25** : 54. 1898.

ILLUSTRATIONS: PLATE 56, *f. 1*; basal leaf, *f. 2*; dissection of flower, *f. 3*; pistil, *f. 4*; stamens, *f. 5*; fruiting hypanthium and calyx, *f. 6*.

Stem stout from a perennial root, erect or decumbent, .5–1 m. high, densely glandular-hirsute and heavy scented, leafy throughout. Stipules ovate, about 1.5 cm. long. Leaves pinnate, the lower with 3–4, the upper with 1–3 pairs of leaflets, more or less glandular-villous ; leaflets ovate to oblong, 3–5 cm. long, doubly serrate with mostly rounded teeth, the upper generally more or less confluent. Cyme spreading and leafy ; pedicels very short, 1–3 mm. long, seldom longer. Hypanthium campanulate, in fruit 5–6 mm. in diameter, more or less tinged with brown ; bractlets ovate, 3–5 mm. long, generally 3-toothed at the apex, spreading, a little exceeding the triangular-lanceolate sepals, which

are erect in fruit. Petals white, oblong, a little shorter than the sepals. Stamens 10, with flat dilated filaments and oblong anthers.

It has been suggested that this species is the same as *H. grandis* Hook. & Arn., but I have seen a specimen collected by J. W. Blankinship in Humboldt Co., 1893, which agrees fully with the description of *H. grandis*. This specimen I must refer to *H. Californica* and not to *H. frondosa* as it differs in no respect from the former, except in the larger and fewer leaflets and slightly longer pedicels.

Rather local in the bay region of California. Specimens examined:

California: E. L. Greene, 1889; Mrs. Brandegee.

2. *Horkelia Californica* Cham. & Schlecht.

Horkelia Californica Cham. & Schlecht. *Linnaea*, **2**: 26. 1827.

Don, *Gard. Dict.* **2**: 562; *Dietr. Syn. Pl.* **2**: 1628; Walp. *Rep.* **2**: 36; Regel, *Act. Hort. Petr.* **1**: 151; Presl, *Epim.* 198.

Torr. & Gray, *Fl. N. Am.* **1**: 434; Hook. & Arn. *Bot. Beechey's Voy.* 139; Gray, *Proc. Am. Acad.* **6**: 529; Wats. *King's Rep.* **5**: 447; Torr. *Bot. U. S. Expl. Exp.* 288; Brewer & Wats. *Bot. Cal.* **1**: 181; Rothrock, *Wheeler's Exp.* **6**: 360; Rattan, *An. Key W. Coast Bot.* 52; Behr, *Fl. Vie. San Fran.* 249.

Sibbaldia Californica Spreng. *Syst.* **4**²: 341. 1827. *Dietr. Syn.* **2**: 1020.

Potentilla Californica Greene, *Pittonia*, **1**: 100. 1887.

Greene, *Fl. Fran.* **1**: 66; Man. *Bay Reg. Bot.* 116; K. Brandegee, *Zoe*, **2**: 349.

Horkelia grandis Hook. & Arn. *Bot. Beechey's Voy.* 339. 1841.

ILLUSTRATIONS: PLATE 57, *f.* 1-2; dissection of flower, *f.* 3; stamen, back view, *f.* 4; front view, *f.* 5; pistil, *f.* 6.

Root perennial. Stems stout, .5-1 m. high, densely glandular and very fragrant, as well as the foliage, leafy. Basal leaves numerous, long-petioled, pinnate; leaflets 5-10 pairs. Stem leaves smaller, the leaflets more crowded, all densely glandular-hirsute; leaflets 2-5 cm. long, broadly obovate or orbicular in outline, toothed and incised, sometimes 3-5-cleft with mostly acute teeth, the upper often confluent. Inflorescence open cymose-dichotomous; pedicels short, 2-5 mm. long. Hypanthium campanulate, in fruit about 1 cm. in diameter, densely glandular and veined, often purple tinged; bractlets 5-10 mm. long, ribbed, ovate and generally 3-toothed at the apex, the middle tooth the longest, somewhat exceeding the ovate acute sepals; bractlets and sepals generally erect in fruit. Petals white, strap-shaped, oblong, much shorter than the sepals. Stamens 10, with flat

filaments and oblong anthers. Stipules about 1 cm. long, ovate, generally more or less toothed.

In the coast region of northern and central California, common on woody slopes in the Bay Region.

California, Wheeler Exped., No. 1470; E. L. Greene, 1887, 1891; G. R. Vasey, 1880; J. W. Congdon, No. 278, 1880; Mrs. Curran, 1886; Michener & Bioletti, 1893; J. W. Blankinship, 1893 (= *H. grandis*, according to description); C. G. Pringle, 1882; Alice Eastwood.

3. *Horkelia elata* (Greene) Rydb.

Potentilla elata Greene, Pittonia, **1** : 100. 1887.

Potentilla Californica elata Greene, Fl. Fran. **1** : 66. 1891.

Greene, Man. Bay Reg. Bot. 116.

Horkelia elata Rydb. Bull. Torr. Bot. Club, **25** : 54. 1898.

ILLUSTRATIONS: PLATE 58, *f. 1*: dissection of flower, *f. 2*; stamen, *f. 3*; pistil, *f. 4*; fruiting hypanthium and calyx, *f. 5*.

Stems rather numerous from a perennial root, quite slender, .5–1 m. high, softly but sparingly glandular-villous. Stipules ovate-lanceolate, about 1 cm. long. Basal leaves numerous, slender-petioled, pinnate; leaflets 7–11 pairs, thin and softly hairy, obovate or broadly cuneate-flabelliform, repeatedly cleft and incised into very narrow segments, the upper confluent; the stem leaves similar but smaller and with fewer leaflets. Cyme open; pedicels short, 2–6 mm. long. Hypanthium campanulate, softly hairy and glandular, in fruit 5–8 mm. in diameter; bractlets and sepals triangular-lanceolate, mostly entire, the former 3–8 mm. long, generally exceeding the sepals. Petals white, oblong, about equalling the sepals. Stamens 10.

Professor Greene first described this as a species, but later reduced it to a variety of *Californica*; while it is true that intermediate forms are found, the species is so well marked that it is better to regard it as distinct. It has about the same range as *H. Californica* but seems to be more common.

California: G. R. Vasey, 1875; Hooker & Gray, 1877; Rattan, 1866; M. E. Jones, 1882; C. G. Pringle, 1882; E. L. Greene, 1883; Congdon, 1885; M. K. Curran, 1888; Alice Eastwood, 1893 and 1894; Brandegee, 1893; Mrs. Brandegee, 1892.

§ 2. CUNEATAE.

4. *Horkelia Micheneri* (Greene) Rydb.

Potentilla Micheneri Greene, Erythea, **1**: 5. 1893.

Greene, Man. Bay Reg. Bot. 117.

Horkelia Micheneri Rydb. Bull. Torr. Bot. Club, **25**: 54. 1898.

ILLUSTRATIONS: PLATE 59, *f.* 1-2; dissection of flower, *f.* 3; pistil, *f.* 4; stamens, *f.* 5; fruiting hypanthium and calyx, *f.* 6.

Stems several from a deep perennial root, slightly hirsute, brown, simple below, ascending or erect. Stipules lanceolate, mostly entire, 5-10 mm. long. Basal leaves numerous, slightly pubescent or glabrate, dark green, pinnate, with 10-16 pairs of cuneate leaflets about 1 cm. long, these flabelliform, dissected from the end to the middle into 2-4 segments, these again divided into rather divergent oblong, obtuse lobes. Stem leaves similar, but smaller and with fewer leaflets. Cyme open with divergent branches. Hypanthium hirsute, cupulate, in fruit 4-5 mm. in diameter; bractlets linear-lanceolate, much smaller than the broadly lanceolate sepals. Petals yellowish, spatulate, a little exceeding the sepals.

A comparatively rare mountain plant collected at two widely separated stations.

California: Michener; Michener & Bioletti, 1892; Greene; T. S. Brandegee, 1886; Alice Eastwood, 1896 (Mt. Tamalpais); W. H. Shockley, No. 596, 1888 (White Mts., Mono Co.).

5. *Horkelia sericea* (Gray) Rydb.

Horkelia Californica var. *sericea* Gray, Proc. Am. Acad. **6**: 529. 1865.

Brewer & Wats. Bot. Cal. **1**: 181; Regel, Act. Hort. Petr. **1**: 151; Rattan, An. Key W. Coast Bot. 52.

Horkelia Kelloggii Greene, Bull. Cal. Acad. **2**: 416. 1887.

Behr, Fl. Vic. San Fran. 249.

Potentilla Kelloggii Greene, Pittonia, **1**: 101. 1887.

Greene, Fl. Fran. **1**: 66; Man. Bay Reg. Bot. 116.

Potentilla Californica var. *sericea* K. Brandegee, Zoe, **2**: 349. 1891.

Horkelia sericea Rydb. Bull. Torr. Bot. Club, **25**: 56. 1898.

ILLUSTRATIONS: PLATE 60, *f.* 1-2; dissection of flower, *f.* 3; stamens, *f.* 4; fruiting hypanthium and calyx, *f.* 5; pistil, *f.* 6.

Stem stout, 3-6 dm. high, ascending, or rarely nearly prostrate, silky-pubescent, not glandular. Stipules ovate or lanceolate, 1-2 cm. long, often toothed. Basal leaves numerous, rather short-petioled, pinnate; leaflets 4-7 pairs, rather thick and with prominent veins, densely and finely silky-canescant, obovate, 1-2.5 cm. long, coarsely toothed, the upper confluent. Stem leaves similar but smaller, of 2-5 pairs. Cyme rather dense. Hypanthium densely silky-canescant, cupulate, about twice as wide as deep; bractlets and sepals entire, ovate or lance-ovate, nearly of the same length. Petals white, spatulate, 5-6 mm. long.

Comparatively common in central California as far south as Santa Barbara. Specimens examined:

California: J. T. Rothrock (Wheeler Exp.) No. 19; Kellogg & Harford, No. 212, 1868; H. Edwards, 1877; Wm. Holder (Geol. Surv. Cal.), No. 2582; G. R. Vasey, 1875; C. C. Parry, 1887 and 1888; E. L. Greene, 1887; Alice Eastwood, 1894; 1895; Mary I. Bancroft.

6. *Horkelia Clevelandii* (Greene) Rydb.

Potentilla Clevelandii Greene, Pittonia, **1**: 102. 1887.

Horkelia Clevelandii Rydb. Bull. Torr. Bot. Club, **25**: 54. 1898.

ILLUSTRATIONS: PLATE 61, *f.* 1-2; dissection of flower, *f.* 3; pistil, *f.* 4; stamen, *f.* 5; fruiting hypanthium and calyx, *f.* 6.

Stems several from a perennial root, simple, 2-4 dm. high, finely pubescent, very rarely a little glandular above, often reddish tinged. Stipules ovate, 5-8 mm. long, often toothed. Basal leaves numerous, short-petioled; leaflets 7-11 pairs, densely and finely pubescent, not at all glandular, obovate-cuneate to nearly reniform, deeply crenate-toothed at the apex, entire at the base, 5-10 mm. long. Stem leaves smaller, with fewer cuneate or oblong leaflets. Cyme with rather short erect or spreading branches. Hypanthium finely pubescent, rarely little if at all glandular, cupulate with the depth about one-half the width; bractlets ovate, a little shorter than the ovate-lanceolate acute sepals. Petals spatulate-oblong, a little exceeding the sepals.

It is a native of Lower California and the most southern part of California. A few specimens are a little glandular on the upper part of the stem, and approach *H. cuneata*, which the species most resembles in habit, while the pubescence is more like that of *H. sericea*, but shorter and finer.

California: D. Cleveland, 1885; C. R. Orcutt, 1890; Parry & Lemmon, No. 102 (in part); J. G. Lemmon, 1875; T. S. Brandege, 1893.

Lower California: C. R. Orcutt, 1883; No. 905, 1885.

7. *Horkelia Parryi* (Wats.).

Horkelia Bolanderi Parryi Wats. Bot. Cal. **1**: 182. 1876.

ILLUSTRATIONS: PLATE 62, *f.* 1-2; dissection of flower, *f.* 3; pistil, *f.* 4; stamen, *f.* 5; fruiting hypanthium and calyx, *f.* 6.

Stems numerous from a woody branched caudex, simple, 2-4 dm. high, grayish-strigose, not at all glandular. Stipules ovate to ovate-lanceolate, acute, mostly entire. Basal leaves numerous, densely appressed-silky canescent, pinnate; leaflets 6-11 pairs,

cuneate, entire at the base, coarsely toothed above, 5–10 mm. long. Stem leaves smaller and with narrower leaflets. Cyme rather closely flowered with short branches. Hypanthium densely appressed-hoary or strigose-canescens, cupulate, about half as deep as wide; bractlets and sepals broadly lanceolate, the former generally somewhat smaller. Petals broadly spatulate, a little exceeding the sepals.

The original specimens of this species are lower and less hairy than those of later collections. These have generally been labeled *H. Bolanderi*, of which it is perhaps only a variety, differing mainly in the appressed pubescence and the form of the hypanthium and bractlets. Coville & Funston's specimens seem, however, to connect the two by the more spreading pubescence. It is a native of Southern California. Specimens seen:

California: C. C. Parry, 1875 (type); Parry & Lemmon, No. 103, 1876; and 1879; E. Palmer, 1876; J. C. Nevin, 1880; S. B. and W. F. Parish, No. 607, 1884; S. B. Parish, No. 2368, 1892; No. 3706, 1895; Coville & Funston, No. 1198, 1891; W. L. Jepson, 1892; Burt Davy, 1895.

8. *Horkelia Bolanderi* Gray.

Horkelia Bolanderi Gray, Proc. Am. Acad. 7: 338. 1868.

Wats. King's Rep. 5: 448; Brewer & Wats. Bot. Cal. 1: 182; Rattan, An. Key W. Coast Bot. 52; Regel, Act. Hort. Petr. 1: 152.

Potentilla Bolanderi Greene, Pittonia, 1: 103. 1887.

Greene, Fl. Fran. 1: 67.

ILLUSTRATIONS: PLATE 63, typical form, *f. 1*; dissection of flower, *f. 2*; pistil, *f. 3*; stamen, *f. 4*; fruiting hypanthium and calyx, *f. 5*; tall form, *f. 6* and 7.

Caudex rather slender, much branched and somewhat tufted. Stems several, in the original specimens less than 1 dm. high and nearly scapose, in later specimens 2–3 dm. high and more leafy, slender, finely villous. Stipules lanceolate, 5 mm. long, mostly entire. Basal leaves numerous, pinnate; leaflets 6–11 pairs, loosely and densely villous or hoary-canescens, cuneate, about 5 mm. long, entire at the base, coarsely 3–5-toothed at the apex. Cyme in the original specimens dense, subcapitate, in later ones more open. Hypanthium densely villous or hoary, about 4 mm. in diameter in fruit, saucer-shaped, about a third as deep as wide; bractlets linear-lanceolate, generally much shorter than the broadly lanceolate sepals. Petals oblong-spatulate, apparently cream color, about a third longer than the sepals.

Bolander's type specimens are very low and cespitose, but those of later collections can not be separated from *P. Bolanderi*, although the general habit is quite different. The flower is identical and the pubescence of the same nature, but slightly sparser. It seems to be a very rare or local plant, growing in alkaline soil. Specimens seen:

California: (Lake Co.) Bolander, Nos. 33, 169 and 2655, 1863; Mrs. Curran, 1885 (Mt. Hamilton); Mrs. Brandegee, No. 4.

9. *Horkelia platycalyx*.

Horkelia capitata Torr. Pac. R. R. Rep. 4: 84. 1856-7.

Horkelia Californica paucifoliolata Wats. MSS. in Herb.

ILLUSTRATIONS: PLATE 64, *f. 1*; dissection of flower, *f. 2*; pistil, *f. 3*; stamen, *f. 4*; fruiting hypanthium and calyx, *f. 5*.

Stem from a perennial caudex, stout, .5-1 m. high, glandular-pubescent, leafy, often tinged with red. Stipules ovate, 1-2 cm. long, often toothed. Basal leaves several, more or less glandular-puberulent; leaflets 5-7 pairs, obovate, crenate, 1-2 cm. long. Stem leaves similar but with fewer leaflets. Cyme open and branched. Pedicels rather long, often 2.5 cm. Flowers 15-20 mm. in diameter. Hypanthium glandular-pubescent, saucer-shaped, a fourth to a third as deep as wide; bractlets ovate, a little smaller than the ovate-triangular sepals. Petals oblong or spatulate, exceeding the sepals by about a third.

This species is nearest related to *H. puberula* and *H. cuneata*, but differs in the larger size of the plant and in the broad and flat hypanthium. It is a native of Southern and Lower California. The following specimens have been examined:

California: J. M. Bigelow (Whipple Exp.); Wm. A. Wallace, 1854; G. R. Vasey, 1880; S. B. Parish, 1880; Wm. E. Wheelock, 1893 (type).

Lower California: C. R. Orcutt, No. 840, 1883.

10. *Horkelia puberula* (Greene) Rydb.

Potentilla puberula Greene, Pittonia, 1: 102. 1887.

Horkelia puberula Rydb. Bull. Torr. Bot. Club, 25: 55. 1898.

ILLUSTRATIONS: PLATE 65, *f. 1-2*; dissection of flower, *f. 3*; pistil, *f. 4*; stamens, *f. 5*; fruiting hypanthium and calyx, *f. 6*.

Stems mostly several from the woody perennial caudex, 3-6 dm. high, branched, finely glandular-puberulent, leafy. Stipules obovate, often toothed. Basal leaves numerous, puberulent or glabrate; leaflets 5-8 pairs, obovate or cuneate-oblong, 1-2.5 cm. long, coarsely and deeply toothed. Stem leaves similar but smaller and with fewer leaflets. Cyme open, branched, with rather spreading branches. Pedicels 5-15 mm. long. Flowers about 10 mm. wide. Hypanthium glandular-puberulent, cupulate, about half as deep as wide, in fruit about 8 mm. in diameter; bractlets broadly lanceolate, shorter than the ovate-lanceolate sepals. Petals oblong-spatulate, a little exceeding the sepals.

This species differs from the next mainly in the larger size, and should, perhaps, be regarded as a variety thereof, rather than as distinct. It is rather common in the mountains of Southern California from Santa Barbara southward.

California: E. Palmer, No. 123, 1876; S. B. Parish, Nos. 279 and 3651, 1885; Nos. 3036 and 2036, 1888; Nos. 2205 and 2208, 1891; Fritchey, No. 35, 1891; Orcutt, No. 43; Parry & Lemmon, No. 102 (in part); Parry, 1889; Dr. E. Hasse, 1888; G. W. Dunn, 1891; T. S. Brandegee, 1888.

II. *Horkelia cuneata* Lindl.

Horkelia cuneata Lindl. Bot. Reg. **23**: under *t.* 1997. 1837.

Dietr. Syn. Pl. **2**: 1628; Walp. Ann. **2**: 36; Presl, Epim. 198.

Torr. & Gray, Fl. N. Am. **1**: 435; Hook. & Arn. Bot. Beechey's Voy. 338; Torr. Bot. Mex. Bound. Surv. 64; Benth. Pl. Hartw. 309.

Horkelia Douglasiana Nutt.; Hook. & Arn. Bot. Beechey's Voy. 338. As synonym. 1841.

Horkelia Californica var. *cuneata* Gray, Proc. Am. Acad. **6**: 529. 1865.

Regel, Act. Hort. Petr. **1**: 151.

Potentilla Lindleyi Greene, Pittonia, **1**: 101. 1887.

Potentilla multijuga Greene, Fl. Fran. **1**: 66. 1891.

ILLUSTRATIONS: PLATE 66, *f.* 1; dissection of flower, *f.* 2; stamen, *f.* 3; pistil, *f.* 4; fruiting hypanthium and calyx, *f.* 5.

Stems several from a perennial woody caudex, rather slender, 1.5–3 dm. high, few-leaved, villous and glandular, especially on the upper part, sometimes nearly glabrous. Stipules lanceolate or ovate, 5–10 mm. long, mostly entire. Basal leaves rather short-petioled, villous or hirsute-puberulent, or nearly glabrous, pinnate; leaflets 8–12 pairs, cuneate to obovate, entire at the base, deeply toothed above, about 1 cm. long. Stem leaves few and small. Cyme rather dense and few-flowered. Hypanthium villous-glandular, in fruit 5–8 mm. in diameter, cupulate, about half as deep as wide; bractlets ovate-lanceolate, a little smaller than the similar sepals. Petals oblong-spatulate, exceeding the sepals by about a third.

It is very variable as to the pubescence. The type specimens are only sparingly hairy and differ very little from the preceding species except in size. Sometimes it is, however, very hairy, almost as much so as *H. sericea* and *H. Bolanderi*, but the hairs are much coarser; such are T. S. Brandegee's specimens from Point San, 1888, and C. C. Parry's from Monterey, 1850. It seems to be rather common in southern California near the coast.

California: Th. Coulter, No. 133; Nuttall; Douglas; Dr. Ruh; C. C. Parry (Mex. Bound. Surv.), 1850; 1881; 1888; Hartweg, No. 1714; Dr. Antisell, No. 80; A. Gray, 1885; Brewer, Nos. 380 and 653, 1860-2; C. G. Pringle, 1882; T. S. Brandege, 1888.

12. *Horkelia platypetala* Rydberg.

H. Parryi Greene, Bull. Cal. Acad. **2**: 416. 1887. Not *H. Bolanderi* Parry Wats. *Potentilla Parryi* Greene, Pittonia, **1**: 102. 1887.

Greene, Fl. Fran. **1**: 67.

Horkelia platypetala Rydb. Bull. Torr. Bot. Club, **25**: 55. 1898.

ILLUSTRATIONS: PLATE 67, *f. 1*; dissection of flower, *f. 2*; pistil, *f. 3*; stamens, *f. 4*; fruiting hypanthium and calyx, *f. 5*.

Caudex branched and spreading, perennial, woody. Stems several, slender, 1-2 dm. high, branched, glandular-puberulent. Stipules ovate, often pectinately toothed, 5-8 mm. long. Basal leaves very numerous, somewhat villous-puberulent; leaflets obovate-cuneate, 5-10 mm. long, deeply incised. Stem leaves few and small with 1-3 pairs of leaflets. Cyme open with slender branches; pedicels in fruit about 1.5 cm. long, recurved. Hypanthium saucer-shaped, about a third as deep as wide, in fruit about 7 mm. in diameter; bractlets lanceolate, much smaller than the ovate-lanceolate sepals. Petals white, obovate to cuneate-oblong, about half longer than the sepals.

This was described by Professor Greene under the name *Horkelia Parryi* from specimens collected by C. C. Parry in 1887. Some specimens from that collection are labelled *H. Bolanderi Parryi* Wats., but the type specimens of the latter collected by Parry in 1885 belong to another species, differing in the narrower petals and deeper hypanthium. *H. platypetala* has been collected in Amador and Mariposa Counties of California.

California: C. C. Parry; Mrs. K. Curran, 1886; Congdon, No. 68, 1894.

§ 3. CAPITATAE.

13. *Horkelia Hendersonii* Howell.

Horkelia Hendersonii Howell, (List of) Howell's Pac. Coast Plants, Coll. 1887.

Howell, Fl. N. W. Am. **1**: 180.

ILLUSTRATIONS: PLATE 67, *f. 6*; dissection of flower, *f. 7*; pistil, *f. 8*; stamens, *f. 9*; fruiting hypanthium and calyx, *f. 10*.

Stems from a caespitose thick woody caudex, about 1 dm. high, hirsute-villous, tinged with red or purple, simple and few-leaved. Stipules lanceolate, mostly entire. Basal leaves numerous; leaflets 5-8 rather crowded pairs, densely grayish-hirsute, in age

often ferruginous. Cyme dense. Hypanthium cup-shaped, hirsute, more or less purplish, about 4 mm. in diameter; bractlets linear-filiform, shorter than the lanceolate sepals. Petals oblong-linear, generally shorter than the sepals.

A well marked species from the Siskiyou Mountains in southern Oregon.

Oregon: L. F. Henderson, No. 274, 1886; Th. Howell, 1886; No. 682, 1887.

14. *Horkelia parviflora* Nutt.

Horkelia parviflora Nutt.; Torr. & Gray, Fl. N. Am. 1: 435. 1840.

Dietr. Syn. Pl. 2: 1628; Walp. Ann. 2: 36; Regel, Act. Hort. Petr. 1: 151; Gray, Proc. Am. Acad. 6: 529; Wats. King's Rep. 5: 89 and 447; Howell, Fl. N. W. Am 1: 180.

Potentilla Andersonii Greene, Pittonia, 1: 104. 1887.

ILLUSTRATIONS: PLATE 68, *f.* 1-2; dissection of flower, *f.* 3; pistil, *f.* 4; stamens, *f.* 5; fruiting hypanthium and calyx, *f.* 6.

Stems erect or ascending from a perennial short rootstock, densely glandular and more or less tinged with red, 1-2 dm. high. Stipules lanceolate. Basal leaves numerous; leaflets 5-8 pairs, densely hirsute and glandular, obovate or nearly orbicular, coarsely crenate. Stem leaves similar but with cuneate leaflets. Cyme subcapitate. Hypanthium cup-shaped, 2-3 mm. in diameter, hirsute and glandular, often tinged with purple; bractlets linear or nearly filiform, much shorter than the broadly lanceolate sepals. Petals broadly spatulate or obovate, about 3 mm. long.

Watson united this species with *H. fusca*, but it has without doubt a better right to specific rank than *H. capitata*, differing from all of the group by its dense glandular pubescence, and from *H. fusca*, *H. capitata*, etc., in its lower habit. It is a native of the plains of the Sierra Nevada Region. Specimens examined:

Oregon: Nuttall.

California: J. G. Lemmon, No. 67, 1874; A. Gray, 1872; Hooker & Gray, 1877; M. K. Curran, 1881; W. H. Evans, No. 12, 1891.

Nevada: C. L. Anderson, No. 112, 1864; W. E. Bryant.

15. *Horkelia pseudocapitata* Rydb.

Horkelia congesta Newberry, Pac. R. R. Rep. 6³: 73. 1857. Not Dougl.

Horkelia pseudocapitata Rydb.; Howell, Fl. N. W. Am. 1: 180. 1898.

ILLUSTRATIONS: PLATE 69, *f.* 1-2; dissection of flower, *f.* 3; stamens, *f.* 4; pistil, *f.* 5; fruiting hypanthium and calyx, *f.* 6.

Stem ascending or erect, 3-6 dm. high, more or less villous and (except in one speci-

men) not at all glandular, simple or branched above. Stipules ovate or ovate-lanceolate, acute, often more or less toothed. Basal leaves 1–2 dm. long, pinnate; leaflets 4–6 pairs, often very densely villous but sometimes only a little hairy, obovate or cuneate, toothed toward the apex, generally obtuse. Stem leaves similar but with fewer leaflets, those subtending the subcapitate many-flowered cyme nearly equalling the flowers. Hypanthium woolly-hirsute, cupulate; bractlets linear, shorter than the lanceolate acute sepals. Petals broadly spatulate, about 5 cm. long and 3 cm. wide.

It is very nearly related to *H. capitata* and *H. fusca*, and slightly hairy specimens are somewhat hard to distinguish from these species. It has about the same range as *H. parviflora*. Specimens seen:

California: T. S. Brandegee, 1892 (Tanesville, type); Mrs. Austin, Nos. 104 and 236, 1894; J. S. Newberry (Williamson Exp.); J. G. Lemmon, No. 66, 1874; Mrs. Ames, 1873.

Nevada: J. Torrey, No. 123 (a), 1865.

16. *Horkelia capitata* Lindl.

Horkelia capitata Lindl. Bot. Reg. **23**; under *t.* 1997. 1837.

Dietr. Syn. Pl. **2**: 1628; Walp. Ann. **2**: 36; Regel, Act. Hort. Petr. **1**: 151.

Torr. & Gray, Fl. N. Am. **1**: 435; Hook. & Arn. Bot. Beechey's Voy. 338; Gray, Proc. Am. Acad. **6**: 529; Wats. King's Rep. **5**: 447; Brewer & Wats. Bot. Cal. **1**: 181.

Potentilla capitata Greene, Pittonia, **1**: 104. 1887.

ILLUSTRATIONS: PLATE 70, *f.* 1–2; dissection of flower, *f.* 3; stamens, *f.* 4; pistil, *f.* 5; fruiting hypanthium and calyx, *f.* 6.

Stem erect, rather simple, 4–6 dm. high, nearly glabrous below, glandular-hirsute above. Stipules broadly lanceolate, 2–3 cm. long, acuminate, more or less toothed. Basal leaves 2–3 dm. long, pinnate, nearly glabrous; leaflets 5–7 pairs, obovate or oval, 2–3 cm. long, deeply incised-toothed. Stem leaves similar, but the upper with narrower oblanceolate acute leaflets, those subtending the subcapitate cyme simple, broad and palmately divided into lanceolate, acuminate, glandular ciliate segments which about equal the flowers. Hypanthium glandular-hirsute, deeply cup-shaped; bractlets linear, nearly equalling the triangular-lanceolate acuminate sepals. Petals broadly cuneate, 5–6 mm. long and 4 mm. wide, much exceeding the sepals.

H. capitata is very nearly related to *H. fusca*, and may be but a variety of that species. There are no specimens in the collections I have seen that fully resemble Douglas' type specimens; those collected by Cronkhite are the only ones that may be included in *H. capitata*, but they are also so close to *H. fusca* that they may be referred to it.

Oregon: Douglas; Cronkhite, 1864.

17. *Horkelia fusca* Lindl.

Horkelia fusca Lindl. Bot. Reg. **23**: t. 1997. 1837.

Dietr. Syn. Pl. **2**: 1628; Walp. Ann. **2**: 36; Presl, Epim. 198; Regel. Act. Hort. Petr. **1**: 152.

Torr. & Gray, Fl. N. Am. **1**: 435; Hook. and Arn. Bot. Beechey's Voy. 338; Gray, Proc. Am. Acad. **6**: 529; Wats. King's Rep. **5**: 448; Brewer & Wats. Bot. Cal. **1**: 181; Rattan, An. Key W. Coast Bot. 52; Howell, Fl. N. W. Am. **1**: 179.

Potentilla Douglasii Greene, Pittonia, **1**: 103. 1887.

Greene, Fl. Fran. **1**: 67.

ILLUSTRATIONS: Lindl. Bot. Reg. **23**: pl. 1997; PLATE 71, f. 1-2; dissection of flower, f. 3; pistil, f. 4; stamens, f. 5; fruiting hypanthium and calyx, f. 6.

Stem 2-6 dm. high, erect or ascending, often much branched, more or less glandular, especially upward, often more or less tinged with brown or purple. Stipules ovate to lanceolate, acute, more or less toothed, 1-2 cm. long. Basal leaves generally numerous, 1-2 cm. long, somewhat glandular-pubescent or glabrate; leaflets 5-7 pairs, obovate or cuneate, toothed or incised toward the apex, .75-2 cm. long. Stem leaves similar but with fewer leaflets. Leaves subtending the subcapitate cymes small, much shorter than the heads. Hypanthium glandular-villous, cupulate, more or less tinged with brown or purple; bractlets linear, much shorter than the ovate-lanceolate sepals. Petals broadly cuneate, about 3 mm. long and 2 mm. wide.

This is the most common species of *Horkelia*, growing throughout the larger part of California and Oregon, and has also been collected in Idaho by L. F. Henderson, No. 3144, 1896.

18. *Horkelia tenella* (Wats.) Rydb.

Horkelia fusca var. *tenella* Wats. Bot. Cal. **1**: 181. 1876.

Potentilla Douglasii var. *tenella* Greene, Fl. Fran. **1**: 67. 1891.

Horkelia tenella Rydb. Bull. Torr. Bot. Club, **25**: 55. 1898.

Howell, Fl. N. W. Am. **1**: 179.

ILLUSTRATIONS: PLATE 72, f. 1; dissection of flower, f. 2; pistil, f. 3; stamens, f. 4; fruiting hypanthium and calyx, f. 5.

Perennial. Stem 1-3 dm. high, slender, erect and simple, more or less tinged with red, often nearly glabrous below, densely glandular above. Stipules lanceolate, generally with a few coarse teeth. Basal leaves numerous, pinnate, hirsute-puberulent and glandular or glabrate; leaflets 5-10 pairs, .5-1 cm. long, cuneate or obovate in outline, divided to below the middle or sometimes almost to the base into linear or linear-oblong segments. Stem leaves few and similar; those subtending the subcapitate or sometimes quite open

cymes, small and simple, incised, shorter than the flower-cluster. Hypanthium cup-shaped, about 4 mm. in diameter, glandular-hirsute; bractlets linear, much shorter than the lanceolate-triangular sepals. Petals cuneate, slightly emarginate, 3–4 mm. long and 4 mm. wide.

It is less common than the preceding species, but extends farther north.

California: J. G. Lemmon, No. 1043, 1874; 1875; T. S. Brandege, 1892; Mrs. R. M. Austin, 1882.

Washington: T. J. Howell, 1880; No. 206, 1881; 1882; F. Liddeke; W. A. Suksdorf, No. 33, 1881.

Oregon: J. & T. J. Howell, No. 294. 1880.

19. *Horkelia tenuiloba* (Torr.) Gray.

Horkelia fusca var. *tenuiloba* Torr. Pac. R. R. Rep. 4: 84. 1857.

Horkelia tenuiloba Gray, Proc. Am. Acad. 6: 519. 1865.

Brewer & Wats. Bot. Cal. 1: 182; Wats. King's Rep. 5: 448; Regel, Act. Hort. Petr. 1: 153.

Potentilla tenuiloba Greene, Pittonia, 1: 105. 1887.

Greene, Fl. Fran. 1: 67; Man. Bay Reg. Bot. 116.

Potentilla stenoloba Greene, Erythea, 3: 36. 1895.

ILLUSTRATIONS: PLATE 73, *f.* 1–2; dissection of flower, *f.* 3; pistil, *f.* 4; stamens, *f.* 5; fruiting hypanthium and calyx, *f.* 6.

Stems 1–2 dm. high from a perennial branched and often horizontal caudex, more or less tinged with brown, hirsute-villous, not at all glandular, mostly simple. Stipules ovate-lanceolate, often pectinately toothed. Basal leaves numerous, pinnate; more or less grayish hirsute; leaflets 6–10 pairs, about 1 cm. long, divided almost to the base into linear segments. Stem leaves similar but smaller. Cyme dense, often nearly subcapitate. Hypanthium cupulate, about 5 mm. in diameter, hirsute; bractlets lanceolate, much smaller than the broadly lanceolate sepals. Petals oblong, very little exceeding the sepals.

This species belongs to the Coast Range of California, and is a rather rare plant. The following specimens have been examined:

California: Bigelow (Whipple Exp.) 1853–4; G. R. Vasey, No. 165, 1880; Mrs. Curran, 1885.

§ 4. TRIDENTATAE.

20. *Horkelia tridentata* Torr.

Horkelia tridentata Torr. Pac. R. R. Rep. 4: 84. 1857.

Gray, Proc. Am. Acad. 6: 530; Brewer & Wats. Bot. Cal. 1: 182; Rattan, An. Key W. Coast Bot. 52; Rothrock, Rep. U. S. Geogr. Surv. 4: 360; Regel, Act. Hort. Petr. 1: 152; Howell, Fl. N. W. Am. 1: 181.

Ivesia tridentata Gray, Proc. Am. Acad. **7**: 338. 1868.

Rothrock, in Wheeler's Exp. **4**: 114; Wats. Bot. King's Exp. 448.

Horkelia Tilingi Regel, Act. Hort. Pet. **1**: 153.

Potentilla Tilingi Greene, Pittonia, **1**: 105. 1887.

Greene, Fl. Fran. **1**: 68.

ILLUSTRATIONS: Pac. R. R. Rep. **4**: pl. 6; Regel, Gart. Fl. **1872**, pl. 711.* PLATE 74, f. 1; dissection of flower, f. 2; pistil, f. 3; stamens, f. 4; fruiting hypanthium and calyx, f. 5.

Root deep, perennial, but not very thick. Stems several, ascending or decumbent, 2-4 dm. high, silky-villous, simple. Stipules very variable, sometimes ovate and entire, sometimes finely dissected. Basal leaves numerous, grayish or white-silky, or glabrous on the upper surface, pinnate, of 3-4 pairs of cuneate or obovate leaflets, which are generally 3-toothed at the apex (rarely 4-5-toothed, or entire) and about 1 cm. in length. Stem leaves smaller with 1 or 2 pairs. Cyme often somewhat branched with sub-capitate small clusters at the end of the branches or the simple stem. Hypanthium silky-villous, cupshaped, in fruit 3-4 mm. in diameter; bractlets linear, a third to a half the length of the broadly ovate sepals. Petals oblanceolate, a little longer than the sepals. Filaments all linear-lanceolate. Pistils 5-10.

Common throughout the mountain regions of California and southern Oregon.

21. *Horkelia flavescens*.

ILLUSTRATIONS: PLATE 75, f. 1-2; dissection of flower, f. 3; pistil, f. 4; stamens, f. 5-6; fruiting hypanthium and calyx, f. 7.

Tufted from a perennial deep root. Stems several, subscapose or with a few small leaves, sparingly silky-villous, scarcely more than 1 dm. high. Basal leaves numerous, sparingly silky-villous, pinnate, with 3 or 4 pairs of cuneate or obovate leaflets, which are about 1 cm. long and 2-3-toothed at the apex. Cyme much contracted, dense, subcapitate. Hypanthium silky-villous, cupulate, more or less tinged with brown; bractlets linear, about half as long as the ovate-triangular sepals. Petals spatulate, unguiculate, yellowish, at least in the dry state. Filaments of the antisealous stamens triangular to lanceolate, those of the antipetalous ones lanceolate. Pistils 8-15.

This has hitherto been included in *H. tridentata*, but it is undoubtedly a good species, differing in the inflorescence and the flowers, though the vegetative organs are essentially the same in the two.

California: J. G. Lemmon, No. 68, 1894; No. 90, 1875 (type); Miss Pulsifer, 1872; Mrs. E. P. Ames, 1872; 1876; Mrs. R. M. Austin, 1887; 1876.

22. *Horkelia congesta* Hook.

Horkelia congesta Hook. Bot. Mag. **56**: *pl.* 2880. 1829.

Don, Gard. Dict. **2**: 562; Dietr. Syn. Pl. **2**: 1628; Walp. Rep. **2**: 36; Regel, Act. Hort. Petr. **1**: 153 (in part); Howell, Fl. N. W. Am. **1**: 180.

Hook. Fl. Bor. Am. **1**: 196; Eat. Man. Ed. 7: 339; Eat. & Wr. N. Am. Bot. 273.

Sibbaldia congesta Dietr. Syn. Pl. **2**: 1020. 1840.

Potentilla congesta Baillon, Hist. Pl. **1**: 369. 1867-9. Greene, Pittonia, **1**: 104. 1887.

ILLUSTRATIONS: Hook. Bot. Mag. **56**: *pl.* 2880; PLATE 76, *f.* 1; dissection of flower, *f.* 2; pistil, *f.* 3; stamen, *f.* 4; fruiting hypanthium and calyx, *f.* 5.

Stem from a short erect perennial rootstock, slender, strict, sparingly ciliate below, glabrous or finely puberulent above, 3-4 dm. high. Stipules pectinately dissected, the lower occasionally divided into linear segments as in the next section. Basal leaves pinnate; leaflets 4 or 5 pairs, sparingly appressed-silky and ciliate, light green, thin and shining, linear-oblong, 1-1.5 cm. long, entire, except at the very apex, where they are deeply 2-3-toothed, the teeth acute. Stem leaves smaller with linear leaflets. Cyme branched, with few upright branches, terminated by small subcapitate clusters of flowers. Hypanthium hemispheric, tinged with light brown, sparingly silky-villous, about 5 mm. in diameter; bractlets linear-filiform, a little shorter than the ovate acuminate sepals. Petals broadly spatulate, yellowish, at least in the dry state, exceeding the sepals by one-half. Stamens 10; filaments all lanceolate.

This species is intermediate between *H. tridentata* and *H. hirsuta*, with the latter of which it has been confused. The original description fits both, but Hooker's plate was without doubt drawn from a specimen of this and not of the next. The few leaflets, slender stem and rather few flowers represented in the plate are those of the present species. It is a rare plant; the only specimens seen by me are the following:

Oregon: Thomas Howell, 1881; 1884; No. 684, 1887.

§ 5. HIRSUTAE.**23. *Horkelia hirsuta* Lindl.**

Horkelia hirsuta Lindl. Bot. Reg. **23**: under *pl.* 1997. 1837.

Horkelia congesta Torr. & Gray, Fl. N. Am. **1**: 434. 1840.¹

Hook. & Arn. Bot. Beechey's Voy. 339; Gray, Proc. Am. Acad. **6**: 529; Wats. King's Rep. **5**: 448; Torr. Wilkes' Exp. **17**: 288; Brewer & Wats. Bot. Cal. **1**: 181; Rattan, An. Key W. Coast Bot. 52; Howell, Fl. N. W. Am. **1**: 189, in part.

Horkelia pilosa Nutt.; Torr. & Gray, Fl. N. Am. **1**: 434. As synonym. 1840.

¹ As to description, this citation and the following ones may also refer to the true *H. congesta*.

ILLUSTRATIONS: PLATE 77, *f. 1*; dissection of flower, *f. 2*; pistil, *f. 3*; stamen, *f. 4*; fruiting hypanthium and calyx, *f. 5*.

Caudex scaly and very hirsute. Stems about 3 dm. high, strict and simple, somewhat striate, hirsute with long spreading hairs, a little glandular above. Stipules pectinately divided into linear segments, those of the basal leaves very finely dissected and very hairy. Basal leaves numerous, pinnate, silky-pubescent, the rachis long-hirsute; leaflets 5-9 pairs, cuneate or oblong-cuneate, 1-2 cm. long, 3-5-toothed at the apex, with oblong acute teeth. Stem leaves similar but with nearly linear leaflets. Cyme very dense and flowers subsessile. Hypanthium cupulate, about half as deep as wide, about 5 mm. in diameter, silky-hirsute; bractlets linear, nearly filiform, a little shorter than the lanceolate or ovate-triangular sepals. Petals white, broadly spatulate, a little exceeding the sepals.

A rare plant, growing in the interior of Oregon and northern California. The following specimens belong to this species:

Oregon: Nuttall; T. Howell, 1881.

California: Wilkes' Exp., No. 1145; C. C. Parry, 1887; Douglas.

24. *Horkelia daucifolia* (Greene) Rydb.

Horkelia congesta Brew. & Wats. Bot. Cal. **1**: 181. In part. 1876.

Potentilla daucifolia Greene, Pittonia, **1**: 160. 1888.

Potentilla congesta var. *lobata* Lemmon, Bull. Torr. Bot. Club, **16**: 221. 1889.

Horkelia daucifolia Rydb. Bull. Torr. Bot. Club, **25**: 55. 1898.

ILLUSTRATIONS: PLATE 79; *f. 1-2*; dissection of flower, *f. 3*; stamen, *f. 4*; pistil, *f. 5*; fruiting hypanthium and calyx, *f. 6*.

Caudex covered with densely pubescent scales. Stem about 3 dm. high, strict and mostly simple, pilose with long fine hairs and glandular throughout. Stipules pectinately divided into linear segments, those of the basal leaves finely twice dissected into nearly filiform, hairy, more or less curled segments. Leaves pinnate, sparingly silky-pilose, the rachis with long spreading hairs; leaflets 8-12 pairs, 1-3 cm. long, divided to near the base into linear acute segments. Cyme more open than in *H. hirsuta*; pedicels 3-10 mm. long. Hypanthium silky-pilose, cupulate, in fruit about 8 mm. in diameter; bractlets linear, nearly subulate, a little shorter than the broadly lanceolate sepals. Petals cream-color, spatulate-oblong, a little exceeding the sepals.

It is evidently nearly related to both the preceding and the following species, and is apparently more common than either, especially in the Klamath region of California and Oregon.

California: E. L. Greene, No. 765, 1876; Mary K. Curran, 1887; Lemmon and wife, 1889.

Oregon: E. Hall, No. 133, 1831; Howell, 1887; 1889; J. W. Marsh, 1878.

25. *Horkelia caruifolia* Rydberg.

Horkelia caruifolia Rydb.; Howell, Fl. N. W. Am. **1**: 181. 1898.

ILLUSTRATIONS: PLATE 79, *f. 1*; dissection of flower, *f. 2*; stamen, *f. 3*; pistil, *f. 4*; fruiting hypanthium and calyx, *f. 5*.

Caudex scaly. Stem slender, strict, simple, silky-pilose and villous-puberulent, but not at all glandular. Stipules pectinately dissected into very narrowly linear segments, those of the basal leaves twice dissected into nearly filiform curled and hairy segments. Leaves pinnate, sparingly silky-pilose, the rachis with divergent hairs; leaflets 6–10 pairs, 1–2 cm. long, finely dissected into narrowly linear segments. Cyme rather dense, and pedicels very short. Hypanthium silky-villous, cupulate, 5–7 mm. in diameter; bractlets linear, shorter than the broadly lanceolate acute sepals. Petals broadly spatulate or obcordate, with a claw, a little exceeding the sepals.

A very rare plant, collected, as far as I know, in one locality only.

Oregon (near Ashland): Thomas Howell, Nos. 685 and 1129, 1887; Mrs. R. M. Austin, No. 256, 1893.

26. *Horkelia laxiflora* (Drew) Rydb.

Potentilla laxiflora Drew, Bull. Torr. Bot. Club, **16**: 151. 1889.

Greene, Fl. Fran. **1**: 67.

Horkelia laxiflora Rydb. Bull. Torr. Bot. Club, **25**: 55. 1898.

ILLUSTRATIONS: PLATE 80, *f. 1–2*; dissection of flower, *f. 3*; pistil, *f. 4*; stamen, *f. 5*.

Caudex covered with densely hirsute scales. Stem rather slender, ascending, simple below, 2–3 dm. high, nearly glabrous. Lower stipules finely divided into filiform, more or less hairy, curled segments, the upper lanceolate, 5–10 mm. long, more or less toothed. Basal leaves many, slightly hairy, in age glabrate, pinnate; leaflets 10–12 pairs, cuneate-flabelliform, cleft at the apex for about half of their length into 2–5 oblong acute divisions. Stem leaves small and few. Cyme open and branched; branches divergent; pedicels 3–10 mm. long. Hypanthium finely puberulent, cupulate, in fruit 3–4 mm. in diameter; bractlets linear, much smaller than the triangular-lanceolate acuminate sepals. Petals white, spatulate, exceeding the sepals. Stamens 10; filaments white, petaloid-dilated. Pistils few.

California: Chesnut & Drew, 1888 (Hy-Am-Pum Valley, Humbolt Co., in pine woods).

27. *Horkelia Howellii* (Greene) Rydb.

Potentilla Howellii Greene, Pittonia, **1**: 104. 1887.

Horkelia Howellii Rydb. Bull. Torr. Bot. Club, **25**: 55. 1898.

Howell, Fl. N. W. Am. **1**: 181.

ILLUSTRATIONS: PLATE 81, *f. 1*; dissection of flower, *f. 2*; pistil, *f. 3*; stamen, *f. 4*; fruiting hypanthium and calyx, *f. 5*.

Caudex covered with densely hispid scales (remains of the lower part of the stipules). Stem slender, strict and simple, more or less red, sparingly villous and somewhat glandular. Lower stipules finely twice dissected into filiform, curved and hairy segments, the upper 5–10 mm. long, ovate, more or less dissected into oblong or lanceolate lobes. Basal leaves numerous, more or less villous, especially the rachis, in age glabrate, with 5–20 pairs of small crowded leaflets, these often divided to the base into two or three oblong or oval, entire, or 2–3-cleft segments 3–10 mm. long. Cyme open with divergent branches but with very short pedicels. Hypanthium cupulate, villous and glandular, in fruit 3–4 mm. in diameter; bractlets linear or linear-lanceolate, smaller than the lanceolate sepals. Petals white, broadly spatulate, with somewhat erose apex, exceeding the sepals.

This species and the next differ from all the other species of *Euhorkelia* in their leaves, the leaflets being, as in *Ivesia*, divided to near the base and more or less imbricated. The structure of the flowers is almost the same as in the preceding species. It is apparently a rare, or at least local, plant of southwestern Oregon. Specimens seen:

Oregon: Thomas Howell, 1884 and 1887; T. S. Brandegee, 1885 (Waldo); L. F. Henderson, No. 1407, 1887 (Merlin).

§ 6. SERICATAE.

28. *Horkelia sericata* Wats.

Horkelia sericata Wats. Proc. Am. Acad. **20**: 364. 1885.

Rattan, An. Key W. Coast Bot. 52; Howell, Fl. N. W. Am. **1**: 181.

Potentilla sericata Greene, Pittonia, **1**: 104. 1887.

ILLUSTRATIONS: PLATE 81, *f. 6*; dissection of flower, *f. 7*; pistil, *f. 8*; stamen, *f. 9*; fruiting hypanthium and calyx, *f. 10*.

Caudex covered with densely hirsute scales. Stems several, very slender, strict and simple, somewhat villous and tinged with red. Stipules lanceolate, about 5 mm. long,

mostly entire. Basal leaves many, densely white silky-villous, pinnate, with 10–18 very crowded pairs of small leaflets .5 cm. long, which are ovate-oblong and entire, or cleft to the base into 2–3 similar segments. Stem leaves similar but smaller. Cyme few-flowered and contracted. Hypanthium cupulate, densely silky, 3–4 mm. in diameter; bractlets linear, shorter than the lanceolate sepals. Petals obcordate, unguiculate, much exceeding the sepals, white.

This plant is not very nearly related to any of the other *Horkeliae*. It comes perhaps nearest to *H. Howellii*, but lacks the open cyme and dissected stipules of that species. Only the specimens from the original collection are known.

Oregon: T. Howell, 1884 (Coast Mountains, Curry Co.).

§ 7. PURPURASCENTES.

29. *Horkelia pinetorum* (Coville) Rydb.

Potentilla purpurascens pinetorum Coville, Proc. Biol. Soc. Wash. **7**: 77. 1892.

Coville, Cont. U. S. Nat. Herb. **4**: 96.

Horkelia pinetorum Rydb. Bull. Torr. Bot. Club, **25**: 55. 1898.

ILLUSTRATIONS: PLATE 82, *f. 1*; dissection of flower, *f. 2*; pistil, *f. 3*; stamens, *f. 4*; fruiting hypanthium and calyx, *f. 5*.

Caudex cespitose from a deep woody root. Stem glabrous, about 3 dm. high, slender and somewhat branched. Stipules ovate, entire, about 5 mm. long. Basal leaves numerous, 1–1.5 dm. long, pinnate, with 15–20 pairs of thin glabrous leaflets which are 5–7 mm. long and divided to near the base into 2–4 broadly oblong segments. Stem leaves minute. Cyme open with ascending branches. Hypanthium deeply cupulate or nearly campanulate, hairy, tinged with brown or purple. Bractlets oblong or ovate, erect, about a third the length of the reflexed lanceolate sepals. Petals spatulate, white, slightly exceeding the sepals.

This was first described as a variety of *H. purpurascens*, but although related to it, it is without any doubt a good species. It is, according to Coville, common in pine woods on the North Fork of Kern River.

California: Coville & Funston, No. 1579, 1891.

30. *Horkelia purpurascens* Wats.

Horkelia purpurascens Wats. Proc. Am. Acad. **11**: 148. 1876.

Brewer & Wats. Bot. Cal. **1**: 182; Rothrock, Wheeler's Exp. **4**: 360; Rattan, An. Key W. Coast Bot. 52.

Potentilla purpurascens Greene, Pittonia, **1**: 105. 1887.

Greene, Fl. Fran. 1: 68.

ILLUSTRATIONS: Wheeler's Exp. 4: *pl. 34*. PLATE 83, *f. 1-2*; dissection of flower, *f. 3*; pistil, *f. 4*; stamens, *f. 5*; fruiting hypanthium and calyx, *f. 6*.

Caudex from a deep woody root, erect, short and covered with brown scales. Stem strict, 1-2 dm. high, densely but finely hirsute. Stipules ovate, entire, 3-4 mm. long. Basal leaves numerous, less than 1 dm. long, densely hirsute, pinnate, with about 20 pairs of rather thick crowded leaflets, which are only 2-4 mm. long and divided almost to the base into 2-4 oval segments. Cyme narrow with upright branches. Hypanthium hirsute, cupulate or nearly campanulate; bractlets linear, about half as long as the lanceolate sepals.

California: J. T. Rothrock (Wheeler's Exp.), No. 327, 1875 (Headwaters of Kern River).

§8. UNGUICULATAE.

31. *Horkelia argyrocoma*.

ILLUSTRATIONS: PLATE 84, *f. 1*; dissection of flower, *f. 2*; stamen, *f. 3*; pistil, *f. 4*; fruiting hypanthium and calyx, *f. 5*.

Root thick and deep, crowned by a short rootstock covered by brown hairy scales. Stems decumbent or ascending, slender, tinged with brown, silky-villous, the lower part, as well as the petioles, covered with long silvery spreading or reflexed hairs in a most beautiful manner. Stipules ovate-lanceolate, often toothed, about 5 mm. long. Basal leaves numerous, about .5 dm. long, densely white-silvery silky, of very numerous densely imbricated leaflets. Cymes dense, subcapitate. Hypanthium cupulate, silky, in fruit 3 mm. in diameter; bractlets oblong, shorter than the ovate sepals. Petals white, spatulate, a third exceeding the sepals. Stamens 20.

It is a native of the San Bernardino Mountains of southern California, and differs from all the related species by the filaments, which are somewhat dilated. The habit and the structure of the flowers are otherwise almost identical with those of the two following. It cannot therefore be placed in *Euhorkelia*. Dr. Watson has labelled some specimens of this species *Ivesia Reevesii*, but the name was never published. Specimens:

California: S. B. Parish, No. 151, 1886; No. 2362, 1892; No. 3137, 1894; No. 3764, 1895; Parry & Lemmon, No. 104, 1876; S. B. & W. F. Parish, No. 151, 1882.

32. *Horkelia sericoleuca*.

Ivesia unguiculata Brewer & Wats. Bot. Cal. 1: 183. Mainly, as to description and Lemmon's specimens. 1880. Not Gray.

Rattan, An. Key W. Coast Bot. 52.

Potentilla unguiculata Greene, Fl. Fran. 1: 68. Mainly. 1891.

ILLUSTRATIONS: PLATE 85, *f. 1*; dissection of flower, *f. 2*; pistil, *f. 3*; stamen, *f. 4*; fruiting hypanthium and calyx, *f. 5*.

Root very thick, crowned with a short rootstock covered with brownish, densely yellowish-hairy scales. Stems several, 3–4 dm. high, erect or ascending, branched, silky-villous and rather leafy. Stipules lanceolate, 1–2 dm. long, often pectinately cleft. Basal leaves numerous, 1–2 dm. long, densely white-silky, pinnate; leaflets numerous, generally over 30, crowded and more or less imbricated; petioles and lower part of the stem silky-villous with long and reflexed hairs; leaflets .5–1 cm. long, divided to the base into oblong segments. Cyme much branched, many-flowered, at first rather dense, in age open, more or less flat-topped. Hypanthium cup-shaped or campanulate, 3–5 mm. in diameter; bractlets oblong or lanceolate, about a third shorter than the ovate-lanceolate or triangular sepals. Petals white, broadly obovate, clawed, much exceeding the sepals.

This species was described by Brewer and Watson in the Botany of California under the name *Ivesia unguiculata* and has since gone under that name. It is evidently very distinct from the original *I. unguiculata* of Gray. It is much nearer related to *H. Pickeringii* from which it differs mainly in the more robust habit, white petals and slightly longer pedicels. It is a native of the Sierra Nevada of Central California. Specimens examined:

California: J. G. Lemmon, Nos. 11, 12 and 71, 1874; No. 95, 1875; C. F. Sonne, Nos. 6 and 353, 1886; T. S. Brandegee, 1887.

33. *Horkelia Pickeringii* (Gray).

Ivesia Pickeringii Gray, Proc. Am. Acad. 6: 531. 1865.

Torr. Bot. U. S. Expl. Exp. 288; Wats. King's Rep. 5: 448; Brewer & Wats. Bot. Cal. 1: 182; Torr. & Gray in Newberry, Pac. R. R. 6³: 72 (name only); Rattan, An. Key W. Coast Bot. 52; Howell, Fl. N. W. Am. 1: 181.

Potentilla Pickeringii Greene, Pittonia, 1: 105. 1887.

Greene, Fl. Fran. 1: 68.

ILLUSTRATIONS: Bot. U. S. Expl. Exp. *pl. 4*. PLATE 86, *f. 1–2*; dissection of flower, *f. 3*; stamen, *f. 4*; pistil, *f. 5*; fruiting hypanthium and calyx, *f. 6*.

Root deep and thick, crowned by a short erect rootstock covered with brown hairy scales. Stems erect and ascending, 2–4 dm. high, finely villous, more or less leafy, dichotomously branched. Stipules lanceolate. Leaves numerous, grayish or white silky-villous, pinnate with very numerous, crowded and somewhat imbricated leaflets, these

generally less than .5 cm. long, 2-4-cleft to the base into oblong-oval segments. Cyme at first dense, in age open, dichotomously branched, but with nearly sessile flowers. Hypanthium cup-shaped or turbinate, villous, in age 4 mm. in diameter; bractlets linear-lanceolate, about a third shorter than the broadly lanceolate acuminate sepals. Petals yellow, spatulate, a little exceeding the sepals.

The original specimens are less densely silvery than most of later collections; those collected by M. K. Curran are nearly identical with the type. It is a native of the mountains of northern and central California.

California: Wilkes' Exp., No. 1572 (type); Bolander & Keller, 1872; J. G. Lemmon, Nos. 60 and 70, 1874; No. 96, 1875; M. K. Curran, 1887.

34. *Horkelia unguiculata* (Gray).

Ivesia unguiculata Gray, Proc. Am. Acad. **7**: 339. 1868.

Wats. King's Rep. **5**: 448; Brewer & Wats. Bot. Cal. **1**: 183 (in part).

Potentilla unguiculata Greene, Pittonia, **1**: 105. 1887.

Greene, Fl. Fran. **1**: 68 (partly).

Potentilla ciliata Greene, Pittonia, **1**: 103. 1887.

ILLUSTRATIONS: PLATE 87, *f. 1*; dissection of flower, *f. 2*; stamen, *f. 3*; pistil, *f. 4*; fruiting hypanthium and calyx, *f. 5*.

Root deep and thick, crowned with a short erect scaly rootstock. Stems several, more or less brown, sparingly silky-villous, simple, ascending or decumbent, 3-4 dm. high. Stipules pectinately divided, rather large. Basal leaves numerous, somewhat grayish but not densely silky with long hairs, pinnate, with numerous crowded pairs of leaflets, these .5-.75 cm. long, divided to the base into linear-oblong or linear acute segments. Cyme dense, subcapitate. Hypanthium cupulate, slightly silky, 4 mm. in diameter; bractlets lanceolate, slightly shorter than the broadly lanceolate sepals. Petals white, broadly spatulate, exceeding the sepals.

I can not separate *Potentilla ciliata* Greene, from *H. unguiculata*. I have seen the single type specimen, collected by Dr. Kellogg, in the Owen Valley, 1873, and it does not differ from Gray's and Bolander's specimens (*i. e.*, the type specimens of *H. unguiculata*), except in slightly longer leaflets and narrower sepals. *P. ciliata* is described as having 10 stamens; that this is not a normal condition may be seen from the fact that opposite some of the sepals there are two stamens as in *H. unguiculata*, while opposite most of them there is only one, which is generally placed a little to one side.

H. unguiculata is a native of the Sierra Nevada. The following specimens have been examined:

California: Bolander, No. 4964, 1866; A. Gray, 1872 (types); Geo. Engelmann, 1880, 1888; T. S. Brandegee, 1892; Dr. Kellogg, 1873 (*P. ciliata* Greene).

35. *Horkelia campestris* (Jones).

Potentilla Utahensis campestris Jones, Proc. Cal. Acad. (II.) **5**: 680. 1895.

Ivesia Utahensis campestris Jones, l. c. as synonym.

ILLUSTRATIONS: PLATE 88, *f. 1*; dissection of flower, *f. 2*; fruiting hypanthium and calyx, *f. 3*; pistil, *f. 4*.

Root rather slender. Stems several, decumbent or prostrate, more or less tinged with red, somewhat silky-villous, less than 2 dm. long. Stipules lanceolate. Basal leaves numerous, less than .5 dm. long, pinnate, with many rather approximate leaflets, more or less silky-hirsute; leaflets about 5 mm. long, divided to the base into linear-oblong segments. Stem leaves few and smaller. Cyme branched, the branches with subcapitate clusters. Hypanthium cupulate or saucer-shaped, nearly glabrous; bractlets linear, much smaller than the lanceolate-triangular sepals. Petals yellow, spatulate, a little exceeding the sepals.

First described as a variety of *P. Utahensis*, to which it bears only a superficial resemblance. It is evidently nearest related to *H. unguiculata*, but it is known only from the original collection.

California: Coville & Funston, No. 1624, 1891 (Whitney Meadows, Sierra Nevada).

§9. EREMICAE.

36. *Horkelia eremica* (Coville).

Potentilla eremica Coville, Proc. Biol. Soc. Wash. **7**: 76. 1892.

Coville, Cont. U. S. Nat. Herb. **4**: 95.

ILLUSTRATIONS: Cont. U. S. Nat. Herb. **4**: *pl. 7*. PLATE 89, *f. 1*; dissection of flower, *f. 2*; stamen, *f. 3*; pistil, *f. 4*; fruiting hypanthium and calyx, *f. 5*.

Root deep, perennial, thick, woody, crowned by a caespitose caudex. Stems several, decumbent or ascending, finely grayish-puberulent or glabrate, 2–4 dm. high, simple, somewhat leafy. Stipules ovate, 5 cm. or less long, entire. Basal leaves very numerous, grayish hirsute-ciliolate or glabrate, nearly terete and wormlike, with densely crowded, ovate leaflets 2–3 mm. long, which, however, are evidently two-ranked. Stem leaves similar. Cyme narrow, with erect branches, the pedicels 5–15 mm. long. Hypanthium puberulent or glabrate, saucer-shaped, 3 mm. broad; bractlets ovate or oblong, about a third the length of the lanceolate sepals. Petals white, obovate, exceeding the sepals by a half.

This is evidently nearly related to *H. Kingii*, and may grade into it. The original specimens and those collected by H. Engelmann are considerably hairy and in habit very unlike any form of *H. Kingii*; Shockley's specimens, on the other hand, approach that species much more closely. *H. cremica* grows in the alkaline flats of western Nevada.

Nevada: Coville & Funston, No. 366, 1891 (type); H. Engelmann, Nos. 22 and 23, 1859; T. S. Brandege, 1885; W. H. Shockley, No. 533, 1886; No. 237, 1882.

37. *Horkelia Kingii* (Wats.).

Ivesia Kingii Wats. King's Rep. 5: 91 and 448. 1871.

Brewer & Wats. Bot. Cal. 1: 184.

Potentilla Kingii Greene, Pittonia, 1: 105. 1887.

Ivesia pallida Greene, Mss. in herbarium.

ILLUSTRATIONS: PLATE 90, *f. 1*; dissection of flower, *f. 2*; pistil, *f. 3*; stamen, *f. 4*; fruiting hypanthium and calyx, *f. 5*.

Root thick, deep and woody, crowned with a very short erect caudex. Stems several, leafy, glabrous, prostrate, 2–4 dm. long. Stipules ovate, 5–8 mm. long, entire. Basal leaves numerous, glabrous and shining, about 5 cm. long, pinnate, with 20–25 pairs of crowded leaflets, glabrous; leaflets 3–5 mm. long, divided to the base into 2–4 ovate or oblong segments. Cyme narrow, with slender pedicels 5–10 mm. long. Hypanthium saucer-shaped, in fruit 3–4 mm. in diameter; bractlets ovate or lanceolate, about half as long as the broadly lanceolate sepals. Petals white, obovate or broadly spatulate, much exceeding the sepals.

It is very variable in the size and form of the leaflets and of the cyme. The specimens labelled *I. pallida* Greene are unusually large and leafy and have many-flowered and rather flat-topped cymes. It grows in the valleys of the Great Basin, especially in alkaline soil.

Nevada: Watson (King's Exp.), No. 348, 1862 (Monitor Valley); M. E. Jones, No. 2187, 1881; K. Curran, 1883 (*I. pallida* Greene); E. L. Greene, 1893 (Humboldt Wells).

Utah: M. E. Jones, 1891 (Deep Creek); No. 5408, 1894 (Monroe).

§ 10. LYCOPODIOIDES.

38. *Horkelia Muirii* (Gray).

Ivesia Muirii Gray, Proc. Am. Acad. 8: 627. 1873.

Brewer & Wats. Bot. Cal. 1: 183; Rattan, An. Key W. Coast Bot. 52.

Potentilla Muirii Greene, Pittonia, 1: 106. 1887.

Greene, Fl. Fran. 1: 69.

ILLUSTRATIONS: PLATE 90, *f. 6*; dissection of flower, *f. 7*; stamen, *f. 8*; pistil, *f. 9*; fruiting hypanthium and calyx, *f. 10*.

Root perennial, deep, rather thick, crowned by an erect caudex 1–4 cm. high, which is covered with the remains of old leaves. Stem 2–4 cm. high, scapose, few-flowered, filiform, silky-villous. Basal leaves numerous, 2–3 cm. long, densely white-silky, terete and worm-like from the very numerous minute, densely imbricated leaflets. Cyme few-flowered, subcapitate. Hypanthium cupulate, 3 mm. in diameter, silky-villous; bractlets ovate, minute, less than a fourth as long as the ovate sepals. Petals cuneate, shorter than the sepals.

A very rare plant with leaves somewhat resembling those of *Stellariopsis*, but otherwise a typical member of the present group. It is only known from the type locality.

California: (Summit of Mt. Hoffman) John Muir, 1872; J. M. Congdon, 1890.

39. *Horkelia Webberi* (Gray).

Ivesia Webberi Gray, Proc. Am. Acad. 10: 71. 1874.

Brewer & Wats. Bot. Cal. 1: 183; Rattan, An. Key W. Coast Bot. 52.

Potentilla Webberi Greene, Pittonia, 1: 105. 1887.

Greene, Fl. Fran. 1: 69.

ILLUSTRATIONS: PLATE 88, *f. 5*; dissection of flower, *f. 6*; pistil, *f. 7*; stamen, *f. 8*; fruiting hypanthium and calyx, *f. 9*.

Root deep, crowned with an erect, short scaly rootstock. Stems several, slender, short, less than 1 dm. long, nearly scapose, more or less tinged with brown, glabrate. Basal leaves 3–4 dm. long, many, pinnate, with 8–10 crowded pairs of leaflets, grayish silky, but not densely so; leaflets about 1 cm. long, divided to the base into linear or lanceolate acute segments; petiole with long fine silky hairs. Cyme subcapitate. Hypanthium cupulate, tinged with brown, slightly silky, 4 mm. in diameter; bractlets linear or linear-lanceolate, shorter than the ovate or ovate-lanceolate sepals. Petals oblanceolate, yellow, scarcely equalling the sepals.

H. Webberi differs somewhat in habit from the other members of the group. Its leaflets are comparatively few, the segments long, lanceolate or linear, acute, and resemble in form, size and pubescence somewhat those of *H. unguiculata*. The inflorescence and flowers are, however, like those of the rest of the group, although the sepals are somewhat more elongated. It is a native of the Sierra Nevada.

California: J. G. Lemmon, 1873; No. 69, 1874, and No. 93, 1895; Mrs. S. A. Plummer, 1879; Dr. Webber.

Nevada: Collector not given.

40. *Horkelia Utahensis* (Wats.).

Ivesia Utahensis Wats. Proc. Am. Acad. **17**: 371. 1882.

Potentilla Utahensis Greene, Pittonia, **1**: 162. 1888.

ILLUSTRATIONS: PLATE 91, *f. 1*; dissection of flower, *f. 2*; pistil, *f. 3*; fruiting hypanthium and calyx, *f. 4*.

Root perennial, woody, but not very thick, crowned by a caespitose caudex covered with the remains of old leaves. Stems several, about 1 dm. high, simple and few-leaved, glabrous below, glandular above. Stipules broadly ovate, entire. Basal leaves numerous, 5–8 cm. long, glabrous, pinnate, with 15–20 pairs of crowded leaflets, these 3–8 mm. long, cleft to the base into 3 to 5, broadly oblong to nearly linear, one-nerved segments. Stem leaves few and very small. Cyme rather dense and somewhat flat topped. Hypanthium somewhat glandular-puberulent, cup-shaped, veiny, 3 mm. in diameter; bractlets linear, a third shorter than the ovate or lanceolate-ovate sepals. Petals yellowish, spatulate, scarcely exceeding the sepals.

This species has been placed nearest to *H. Kingii*, which it much resembles in the form and size of the leaves. The plant is, however, if everything is taken into consideration, more nearly related to the next and to *H. Gordonii*. Specimens collected by F. Tweedy and T. S. Brandegee, in Washington, are so intermediate between the latter and *H. Utahensis* that it is impossible to determine how to refer them. The typical form has only been collected in Utah.

Utah: M. E. Jones, No. 1231, 1879 (type); 1883.

Washington: (?) F. Tweedy, 1883; T. S. Brandegee, 1882.

California: (?) E. Palmer, No. 172, 1888.

41. *Horkelia scandularis*.

Ivesia pygmaea Wats. Mss. in herb. Not Gray.

ILLUSTRATIONS: PLATE 91, *f. 5*; dissection of flower, *f. 6*; pistil, *f. 7*; stamen, *f. 8*; fruiting hypanthium and calyx, *f. 9*.

Cespitose with a thick woody root. Stems several, less than 1 dm. high, decumbent, slightly glandular-puberulent, nearly leafless. Basal leaves numerous, 2–5 dm. long, pinnate with numerous crowded and somewhat imbricated leaflets, glandular-puberulent, light green, often yellowish; leaflets about 2 mm. long, divided to the base into thick oblong segments. Cyme corymbiform. Hypanthium cupulate or almost saucer-shaped, in fruit 4 mm. in diameter; bractlets oblong, about half the length of the ovate sepals. Petals obovate, a little exceeding the sepals. Stamens 5, nearly equalling the sepals. Pistils 5–10.

It is nearest related to *H. Utahensis*, but differs by the decumbent stems and broader and shorter bractlets and is apparently a very rare plant. It was included by Dr. Watson in *H. pygmaea*, from which it differs in the inflorescence, the absence of bristle-points to the leaflets and the broader petals.

California: W. H. Shockley, No. 572, 1888 (White Mountains.)

42. *Horkelia lycopodioides* (Gray).

Ivesia lycopodioides Gray, Proc. Am. Acad. **6**: 530. 1865.

Wats. King's Rep. **5**: 448.

Ivesia Gordonii var. *lycopodioides* Wats. Bot. Cal. **1**: 183. 1876.

Rattan, An. Key W. Coast Bot. 52.

Potentilla Gordonii var. *lycopodioides* Greene, Pittonia, **1**: 106. 1887.

Greene, Fl. Fran. **1**: 69.

ILLUSTRATIONS: PLATE 92, *f. 1*; leaflets, *f. 2*; dissection of flower, *f. 3*; pistil, *f. 4*; stamen, *f. 5*; fruiting hypanthium and calyx, *f. 6*.

Densely caespitose from a deep woody perennial root. Stem scapose, glabrous, less than 5 cm. high. Basal leaves very numerous and crowded, about 3 cm. long, smooth, with numerous minute crowded and more or less imbricated leaflets, these only 1–2 mm. long, 3-cleft into oval thick segments. Cyme few-flowered and corymbose. Hypanthium cupulate or saucer-shaped, about 3 mm. in diameter, glabrous or slightly puberulent; bractlets oblong, about two-thirds as long as the ovate sepals. Petals yellow, oblong-ob lanceolate, about equalling the sepals. Stamens 5, with slender but short filaments. Pistils 6–12.

H. lycopodioides has been regarded as a variety of *H. Gordonii*, but is without doubt a good species, differing principally by its very small, perfectly glabrous and shining leaflets, the more open and truly cymose inflorescence, and shallower hypanthium. It grows on alpine peaks of the Sierra Nevada.

California: W. H. Brewer, No. 1746, 1863 (Mt. Dana, type); Bolander, 1866; Miss Errington, 1865; G. P. Rixford (Mt. Conness).

43. *Horkelia Gordonii* Hook.

Horkelia Gordonii Hook. Journ. Bot. and Kew Gard. Misc. **5**: 341. 1853.

Walp. Ann. **4**: 664.

Ivesia Gordonii Torr. & Gray in Newberry, Pac. R. R. Rep. **6**: part 3, 72. 1857.

Gray, Proc. Am. Acad. **6**: 530; Wats. King's Rep. **5**: 90 and 448; Brewer & Wats.

Bot. Cal. **1**: 183; Rothrock in Wheeler's Exp. **6**: 114; Rattan, An. Key W. Coast Bot. **52**.

Potentilla Gordonii Greene, Pittonia, **1**: 106. 1887.

Greene, Fl. Fran. **1**: 69.

ILLUSTRATIONS: Hook. Journ. Bot. **5**: *pl. 12*. PLATE 92, *f. 7*; dissection of flower, *f. 8*; pistil, *f. 9*; stamen, *f. 10*; fruiting hypanthium and calyx, *f. 11*.

Root thick and deep. Caudex woody, branched, cespitose, covered with the remains of old leaves. Stem subscapose, minutely glandular-puberulent or glabrous, 1–2 dm. high, seldom 3 dm. Basal leaves numerous, finely puberulent or glabrate, pinnate; leaflets 10–20 rather approximate pairs, 5–12 mm. long, divided into 3–5 segments or again divided. Segments broadly oblong to linear. Stem leaves, if any, very small. Cyme capitate. Hypanthium campanulate, 3–4 mm. in diameter, villous-puberulent and somewhat glandular, yellowish; bractlets linear, about half the length of the ovate sepals. Petals yellow, spatulate or oblanceolate, shorter than the sepals. Stamens 5. Pistils generally 1–3, sometimes more.

It is a very variable species and the most common in the genus, extending from Wyoming to Montana, Washington and central California. It differs from all the members of the group in its deeper campanulate hypanthium.

Horkelia Gordonii alpicola.

Ivesia alpicola Rydberg; Howell, Fl. N. W. Am. **1**: 182. 1898.

More cespitose and more glandular, stems less than 1 cm. high; leaflets shorter.

This plant much resembles *I. pygmaea* in habit, but lacks the bristle-points of the leaves and has always 5 stamens.

About the same range as the species, but generally grows at greater altitudes.

Horkelia Gordonii megalopetala.

Petals large, obcordate, much exceeding the sepals; hypanthium less deep.

Resembles a low plant of *H. Gordonii*, but differs in the characters given. It may be a good species, but the material known is insufficient.

California: Bolander (Mt. Dana, type in Herb. Calif. Acad. Sci.).

44. Horkelia pygmaea (Gray).

Ivesia pygmaea Gray, Proc. Am. Acad. **6**: 531. 1865.

Wats. King's Rep. **5**: 448.

Ivesia Gordonii var. *pygmaea* Wats. Bot. Cal. **1**: 183. 1876.

Rattan, An. Key W. Coast Bot. 52.

Potentilla decipiens Greene, Pittonia, **1**: 106. As to synonyms. 1887. Not Jordan.

ILLUSTRATIONS: PLATE 93, *f. 1*; leaflets, *f. 2*; stipules, *f. 3*; dissection of flower, *f. 4*; pistil, *f. 5*; stamen, *f. 6*; fruiting hypanthium and calyx, *f. 7*.

Caudex closely caespitose from a deep perennial root, densely covered with remains of old leaves. Stem scapose, 4–7 cm. long, finely glandular-puberulent and sometimes with a few longer hairs. Basal leaves very numerous, 2–5 cm. long, finely glandular-puberulent with numerous, minute, very densely crowded and imbricated leaflets, which are 1–2 mm. long, divided to the base into oblong or oval, thick segments, tipped with a bristle. Cyme subcapitate, or in age somewhat corymbose. Hypanthium about 4 mm. in diameter, saucer-shaped, glandular-hirsute; bractlets oblong, about two-thirds as long as the broadly ovate sepals. Petals obovate, a little exceeding the sepals.

H. pygmaea much resembles the first variety of the preceding species, but is easily distinguished by the bristle-points at the ends of the segments of the leaves, by the larger and shallower flower, generally 10 stamens and more numerous pistils. It grows on the higher mountains of the Sierra Nevada.

California: C. F. Sonne, No. 84, 1885; G. P. Rixford; Gustav Eisen, 1885; T. S. Brandegee, 1892; Coville & Funston, No. 1664, 1891; Vernon Bailey, No. 2064, 1891.

Nevada: W. H. Brewer, No. 2812, 1864 (type).

45. *Horkelia Shockleyi* (Wats.).

Ivesia Shockleyi Wats. Proc. Am. Acad. **23**: 263. 1888.

Potentilla decipiens Greene, Pittonia, **1**: 106. 1887. Excluding synonyms. Not Jordan.

Greene, Fl. Fran. **1**: 69.

Potentilla nubigena Greene, Erythea, **3**: 36. 1895.

ILLUSTRATIONS: PLATE 93, *f. 8*; leaflets, *f. 9*; stipules, *f. 10*; dissection of flower, *f. 11*; pistil, *f. 12*; stamen, *f. 13*; fruiting hypanthium and calyx, *f. 14*.

Caudex densely caespitose from a deep woody root, covered with the remains of old leaves. Stem subscapose, densely glandular, 2–5 cm. high. Basal leaves very numerous, 2–4 cm. long, densely glandular, pinnate, with about a dozen pairs of minute leaflets, which are 2–3 mm. long, crowded, cleft to the base into several obovate thick segments mostly tipped with bristles. Inflorescence open, strictly cymose and with diverging branches. Hypanthium about 3 mm. in diameter, saucer-shaped, densely glandular and in age decidedly 5-angled; bractlets ovate, about half the length of the broadly ovate sepals. Petals spatulate, white (?), about equalling the sepals.

This species has been confused with *H. pygmaea*, which it much resembles in habit,

and especially in the leaves, which also have the bristle-points. It differs mainly in the more open, purely cymose inflorescence and smaller and more decidedly angular flowers. The range and habitat are about the same as those of the preceding.

California: W. H. Shockley, No. 466, 1864 (type); No. 84, 1887; J. G. Lemmon, 1873; 1875; Coville & Funston, No. 1800, 1891; C. F. Sonne.

§ II. SAXOSAE.

46. *Horkelia Baileyi* (Wats.).

Ivesia Baileyi Wats. King's Rep. 5: 90 and 449. 1871.

Brewer & Wats. Bot. Cal. 1: 184; Howell, Fl. N. W. Am. 1: 181.

Potentilla Baileyi Greene, Pittonia, 1: 105. 1887.

ILLUSTRATIONS: PLATE 94, *f. 1*; dissection of flower, *f. 2*; flower seen from above, *f. 3*; pistil, *f. 4*; stamen, *f. 5*; fruiting hypanthium and calyx, *f. 6*.

Caudex somewhat caespitose from a more slender root. Stems several, decumbent or ascending, 1–3 dm. long, finely pubescent or glabrate, somewhat leafy. Stipules obovate, entire, about .5 cm. long. Basal leaves many, 1–2 dm. long, pinnate; leaflets 4–6 rather distant pairs, finely pubescent or glabrate, .5–1 cm. long, thin, obovate or orbicular, generally oblique, deeply incised into rounded obovate segments. Stem leaves smaller with 2–3 pairs. Inflorescence rather open and truly cymose, with slender pedicels. Hypanthium 4–5 mm. broad, slightly glandular-villous, saucer-shaped, in fruit evidently 5-angled; bractlets linear-oblong, one-third to two-thirds the length of the broadly ovate sepals. Petals yellow, spatulate, shorter than the sepals. Stamens 5 with short filaments, which incline toward the 4 to 8 pistils.

In the flowers and inflorescence, *H. Baileyi* much resembles the preceding, but the leaves have much fewer and larger leaflets, which are not at all imbricated. The leaves in this and the next species do not suggest a *Horkelia-Ivesia* at all, but the following variety with bristle-pointed leaf-segments approaches *H. Shockleyi*. Specimens:

Nevada: W. W. Bailey (King's Exp.), No. 346, 1867 (type).

Oregon: W. C. Cusick, No. 1256, 1885; Thos. Howell, No. 594, 1885.

Horkelia Baileyi setosa (Wats.).

Ivesia Baileyi var. *setosa* Wats. King's Exp. 5: 91. 1871.

Brewer & Wats. Bot. Calif. 1: 184.

ILLUSTRATION: PLATE 94, *f. 7*, leaf.

Leaves more deeply dissected into narrower, generally bristle-pointed segments.

Nevada: S. Watson, No. 347, 1868 (type); M. E. Jones, No. 3850, 1882; 1898.

47. *Horkelia saxosa* (Lemmon).

Potentilla saxosa Lemmon ; Greene, Pittonia, **1** : 171. 1888.

Perennial, slender, about 3 dm. high, pubescent and viscid-glandular ; leaves pinnate ; leaflets 5–7 pairs, reniform-flabelliform, 1–1.5 cm. long, cleft to the middle into oblong acutish segments. Cyme open. Hypanthium saucer-shaped. Petals yellow, spatulate-oblongate. Stamens 20–30 ; filaments filiform. Pistils 8–10.

It resembles *H. Baileyi* in habit, but differs in the broader leaflets, and the numerous stamens. In this respect and by the fact that the open space between the stamens and pistils is rather narrow, it approaches *Potentilla* proper in the structure of the flowers.

Lower California : Lemmon and wife, 1888 (San Rafael Mountains in crevices of rock) ; C. R. Orcutt, No. 650, 1882 ; 1883.

3. STELLARIOPSIS.

Potentilla § *Stellariopsis* Baillon, Hist. Pl. **1** : 370. 1867–9.

Hypanthium saucer-shaped, small. Bractlets, sepals and petals 5. Petals white, elliptic or round-ovate, white, slightly unguiculate. Stamens 15, inserted on the margin of the disk, separated some distance from the pistil ; filaments filiform, long ; anthers purplish, didymous, obcordate, each half nearly pear-shaped, dehiscent by a subterminal pore. Pistil single, surrounded by numerous bristles ; style long and slender, terminal. Mature achene very large for the size of the flower, at last assuming a more or less horizontal position. Seed inserted near the base of the style, pendulous and anatropous.

The genus contains a single species, native of California, of very peculiar habit and wormlike silky leaves. The general structure of the flower is intermediate between *Potentilla* and *Horkelia* (*Ivesia*), from which genera it differs by the single pistil and the structure of the anthers.

i. *Stellariopsis santalinoides* (Gray).

Ivesia santalinoides Gray, Proc. Am. Acad. **6** : 531. 1865.

Gray, Proc. Am. Acad. **7** : 339 ; Wats. King's Rep. **5** : 448 ; Brewer & Wats. Bot. Cal. **1** : 183 ; Rothrock, Wheeler's Exp. **4** : 360 ; Rattan, An. Key W. Coast Bot. 52.

Potentilla santalinoides Greene, Pittonia, **1** : 106. 1887.

Greene, Fl. Fran. **1** : 69.

ILLUSTRATIONS : PLATE 95, *f.* 1–2 ; dissection of flower, *f.* 3 ; pistil, *f.* 4 ; stamen, *f.* 5 ; fruiting hypanthium and calyx, *f.* 6.

Root deep, perennial, not very thick, crowned with a short erect caudex, which is densely covered with hairy scales. Stems several, erect, much branched, more or less silky-villous on the lower portion with long white spreading or reflexed hairs. Stipules

ovate, .5 cm. or less, often divided. Basal leaves numerous, 3–10 cm. long, densely white-silky, terete and wormlike from the numerous minute crowded leaflets. Stem leaves similar, but smaller. Cyme intricately branched into filiform branches and very slender pedicels 1–2 cm. long. Hypanthium finely puberulent, saucer-shaped, in fruit 3 mm. in diameter; bractlets ovate, minute, about a fourth the length of the ovate sepals. Petals white, broadly obovate or orbicular, twice as long as the sepals.

Rather common in the Sierra Nevada.

4. COMARELLA.

Hypanthium wheel-shaped, *i. e.*, the central portion turbinate, enclosing the ovaries and beset on its inner surface with long bristles, the lateral portion, making an obtuse angle with the former, flat, pentagonal in outline, making nearly a right angle with the pedicel. Petals dark purple, narrowly linear, shorter than the calyx. Stamens 5, inserted on the outer margin of the flat portion of the hypanthium; filaments filiform, bent inward; anthers small, opening by a longitudinal slit. Pistils two; styles long and filiform, terminal. Mature achenes assuming a nearly horizontal position, rather flat. Seed inserted near the base of the style, pendulous, anatropous.

The genus contains two species, natives of Arizona, New Mexico and Utah. The leaves somewhat resemble those of *Ivesia* but the leaflets are less crowded and not imbricated.

1. *Comarella multifoliolata* (Torr.).

Horkelia ? *multifoliolata* Torr. Bot. Sitgreave's Exp. 159. 1853.

Potentilla depauperata Engelm; Gray, Proc. Am. Acad. 7: 399. 1868.

Greene, Pittonia, 1: 105.

Ivesia depauperata Gray; Brewer & Wats. Bot. Cal. 1: 184. 1876.

ILLUSTRATIONS: PLATE 96, *f.* 1–2; dissection of flower, *f.* 3; flower seen from above, *f.* 4; stamen, *f.* 5; pistil, *f.* 6; section of achene, *f.* 7; fruiting hypanthium and calyx, *f.* 8.

Stem 3–6 dm. high, ascending or erect, finely pubescent, in age glabrate, somewhat leafy. Stipules lanceolate, often cleft. Leaves 1–3 dm. long, finely pubescent when young, in age glabrate, pinnate; leaflets 20–30 rather approximate pairs, 5–10 mm. long, 3–5-cleft, with oblong or ovate segments. Cyme open, flat-topped, with diverging branches and slender pedicels. Hypanthium saucer-shaped, puberulent, about 5 mm. in diameter, purplish, in fruit 5-angled; bractlets linear-subulate, somewhat fleshy, much shorter than the broadly lanceolate acuminate purplish-tinged sepals. Petals purple, linear or oblanceolate, acute, shorter than the sepals.

Dr. Torrey in the original description gave, among other characters, the following: "petalis oblongo-cunifolius; staminibus 20," but these characters are evidently wrong. The type specimens are in the Torrey herbarium, and there is only a fragment of a single flower. Dr. Gray found only 5 stamens, wherefore he referred the species questionably to *H. Gordonii*.¹ *Potentilla depauperata* Engelm. was then undescribed, but nobody has hitherto identified it with the present species; from the type specimens, although fragmentary, it is easy to see that the two belong to the same species.

Arizona: Dr. Woodhouse (Sitgreaves' Exp.), 1851 (type); A. L. Anderson, 1864 (Type of *P. depauperata*); J. G. Lemmon and wife, 1884; H. H. Rusby, No. 596, 1883; J. W. Toumey, No. 492, 1892; Dr. E. Palmer, 1869: Oscar Land; Wolf & Rothrock (Wheeler Exp.), No. 369, 1873; C. C. Parry, 1889.

2. *Comarella sabulosa* (Jones).

Potentilla sabulosa Jones, Proc. Cal. Acad. Sci. (II.) 5: 680. 1895.

Ivesia sabulosa Jones, l. c. as synonym.

ILLUSTRATIONS: PLATE 97, *f. 1*; dissection of flower, *f. 2*; pistil, *f. 3*; stamen, *f. 4*; fruiting hypanthium and calyx, *f. 5*.

Stems several from the caudex, ascending, less than 2 dm. high, more or less tinged with brown, slender, glabrous. Stipules ovate-lanceolate. Leaves less than 1 dm. long, glabrate, pinnate; leaflets about 15 rather approximate pairs, 3–5 mm. long, 2–3-cleft into oval segments. Cyme open and rather flat-topped, with divergent branches and slender pedicels. Hypanthium glabrous, saucer-shaped, 3–4 mm. in diameter, in age 5-angled; bractlets linear-subulate, thickish, much smaller than the ovate-lanceolate acuminate sepals.

Very nearly related to the preceding and scarcely distinct. It is a much smaller plant, however, and less tinged with purple. Only the type specimens are known.

Utah: M. E. Jones, No. 6032, 1894 (Sevier River).

5. ARGENTINA Lam.

Argentina Lam. Fl. Franç. 3: 118. 1778.

Potentilla L. Sp. Pl. 495. In part. 1753.

Dactylophyllum Spen. Fl. Frib. 3: 1084. In part.

Hypanthium almost flat; bractlets, sepals and petals normally 5, often, however,

¹ Dr. Torrey has written on the type sheet the following: "Dr. Gray is correct in stating that there are but 5 stamens in this species. He has incorrectly quoted the specific name, calling it '*millefoliata*.'"

more. Petals yellow, broadly elliptic, or almost orbicular, not at all unguiculate, obtuse, never emarginate. Stamens 20–25, in three series, inserted closely around the base of the receptacle as in *Potentilla*; filaments filiform, rather short; anthers slightly didymous, dehiscent by a longitudinal slit. Receptacle hemispheric, bearing very numerous pistils; style filiform, lateral, attached almost at the middle of the ovary, scarcely deciduous. Mature achene with very thick and corky pericarp. Seeds ascending and amphitropous.

The genus contains three species, of which one, *A. anserinoides*, is a native of New Zealand, the two others of arctic and colder temperate regions of the northern hemisphere. They are easily recognized by their interruptedly pinnate leaves, which are generally silvery-white beneath, and their long runners. The flowers are borne on simple pedicels from the axils of the basal leaves, or more commonly from those of the leaves of the plantlets formed on the runners. The roots become thick and fascicled, and are used as an article of food by the natives of Siberia and on the Scottish Islands Tiree and Coll.

1. *Argentina Egedii* (Wormsk.).

Potentilla Egedii Wormsk. Fl. Dan. **9**: fasc. 27, 5.

Lehmann, Mon. 22 and 74; Ser. in DC. Prod. **2**: 282; Spreng. Syst. Veg. **2**: 535; Tratt. Ros. Mon. **4**: No. 43*; Don, Gard. Dict. **2**: 560; Dietr. Syn. Pl. **3**: 189; Rydb. Bull. Torr. Bot. Club, **24**: 12.

Potentilla Anserina Groenlandica Tratt. Mon. Ros. **4**: No. 13. 1824.*

DC. Prod. **2**: 582; Lehm. Del. Sem. Hort. Hamb. **1850**: 10; Rev. Pot. 190; Don, Gard. Dict. **2**: 559; Walp. Rep. **2**: 34; Ann. **2**: 514.

Hook. Parry's 3d Voy. 125*; Fl. Bor. Am. **1**: 189; Torr. & Gray, Fl. N. Am. **1**: 444; Schlecht. Linnaea, **10**: 98; Eat. & Wr. N. Am. Bot. 373; Lange, Consp. Fl. Groen. 5 and 234; Rosenvinge, *ibid.* 655; Macoun, Cat. Can. Pl. 141; Nathorst, Oefv. Kong. Vet. Ak. Förh. **1884**: 30; Eat. Man. Ed. 5: 344; Ed. 6: 281.

Potentilla Anserina Egedii Torr. & Gray, Fl. N. Am. **1**: 444. 1840.

Walp. Rep. **2**: 34; Britt. & Brown, Ill. Fl. **2**: 216.

ILLUSTRATIONS: Fl. Dan. **9**: *pl.* 1578. PLATE 97, *f.* 6; dissection of flower, *f.* 7; pistil, *f.* 8; fruiting hypanthium, *f.* 9.

Perennial with a fascicled root and producing long runners, much smaller in size than the following species. Leaves 3–5 cm. long, pinnate with 5–15 leaflets, nearly or perfectly glabrous above, sometimes white-tomentose beneath, but never silky; leaflets broadly obovate or nearly orbicular, .5–1 cm. long, coarsely toothed with rounder teeth than in the following. Flowers of about the same size as those of the following species,

borne on pedicels 1–3 cm. long. Sepals, bractlets and petals as in the following. Fruiting calyx about 1 cm. in diameter. Achenes lenticular in all specimens examined.

A. Egedii is a native of Arctic America, but extends to the coasts of Massachusetts and Oregon. Specimens examined:

Iceland: Professor and Mrs. C. S. Smith, 1888.

Greenland: Hartz; Holboell; Sorensen, 1893; Eberlin.*

Labrador: Fratres Moravi (Ex. Herb. J. Ball); Miss Macfarlane, 1870.

Martha's Vineyard, Mass.: Oakes.

Alaska: J. Muir (Kotzebue Sound); J. M. Macoun, No. 43, 1891 (Umnock Island); C. A. White, 1881.

Oregon: Isabel Mulford, 1892.

2. *Argentina Anserina* (L.).

Potentilla Anserina L. Sp. Pl. 495. 1753.

L. Sp. Pl. Ed. 2: 710; Mill, Gard. Diet. Ed. 8: No. 1; Ait. Hort. Kew. 2: 213; Dietr. Pflanz. Ed. 2: 90; Willd. Sp. Pl. 2: 1095; Poir. in Lam. Enc. Meth. 5: 584; Persoon, Syn. Pl. 2: 53; Ait. Hort. Kew. Ed. 2, 3: 273; Nestler, Mon. Pot. 24 and 35; Haller, Syn. Pot. 56; Lehm. Mon. Pot. 22 and 71; Sprengel, Syst. Veg. 2: 535; Seringe in DC. Prod. 2: 582; Don, Gard. Diet. 2: 559; Dietr. Syn. Pl. 3: 188; Walp. Rep. 2: 34; Ann. 2: 513; Lehm. Del. Sem. Hort. Hamb. 1850: 10; Rev. Pot. 188.

Michx. Fl. Bor. Am. 1: 304; Pursh, Fl. Am. Sept. 356; Bigelow, Fl. Bost. 124; Ed. 2: 203; Nutt. Gen. N. A. Pl. 1: 310; Eat. Man. Bot. Ed. 2: 380; Ed. 3: 408; Ed. 5: 344; Ed. 6: 281; Ed. 7: 458; Torr. Fl. U. S. 498; Comp. 210; Beck, Bot. 107; Ed. 2: 99; Bigelow, Pl. Bost. 216; Torr. & Gray, Fl. N. Am. 1: 444; Eat. & Wr. N. Am. Bot. 373; Torr. Fl. N. Y. 210; Frem. 1st Exp. 89 [174]; Gray, Man. Ed. 1: 122; Ed. 2: 119; Ed. 5: 155; Pl. Fend. in Mem. Am. Acad. 4: 42; Torr. Pac. R. R. Rep. 4: 84; Newberry, l. c. 6³: 72; Gray, l. c. 12; Book 2, 39; Cooper, l. c. p. 56; Torr. Mex. Bound. Surv. 2: 64; Wood, Class Book. 343; Bot. and Flor. 107; Porter, U. S. Geol. Surv. 1870: 475; 1871: 482; Coulter, l. c. 1872: 765; Wats. in King's Report 5: 89; Proc. Am. Acad. 8: 562; Wheeler's Rep. 8; Port. & Coult. Syn. Fl. Colo. 38; Brewer & Wats. Bot. Cal. 1: 180; Rothrock, Wheeler's Rep. 6: 114; Coulter, Man. Rocky Mts. 86; Tweedy, Fl. Yellowst. Nat. Park, 35; Greene, Pittonia. 1: 87; K. Brandegee, Zoe, 2: 349; Wats. & Coult. in Gray, Man. Ed. 6: 160; Rattan, An. Key W. Coast Bot. 51; Behr, Fl. Vic. San Fran. 249; Greene, Fl. Fran. 1: 63; Man. Bay Reg. 115; Bailey, in Gray, F. F. & G. Bot. Rev. Ed. 152; Aven Nelson, Wy. Exp. Sta. Bull. 28: 102; Rydb. Fl. Neb. 21: 18; Bull. Torr. Bot. Club, 24: 12; Britt. & Brown, Ill. Fl. 2: 216; Howell, Fl. N. W. Am. 1: 179.

Richardson, Frankl. 1st Journ. 739; Ed. 2: App. 20; Cham. Linnaea, **2**: 24; E. Meyer, Pl. Lab. 76; Bongard, Veg. Ins. Sitcha, 132; Lehm. in Hook. Fl. Bor. Am. **1**: 189; Schlecht. Linnaea, **10**: 98; Hook. & Arn. in Beechey's Voy. 113, 123 and 338; Ledeb. Fl. Ross. **2**: 44; Seem. Bot. Herald, 29 and 52; Barnton, Cat. Can. Pl. 8; Provancher, Fl. Can. 189; J. Macoun, Syn. Fl. St. Lawr. (Can. Jour. 1877) 4; Cat. Can. Pl. 141; Lange, Consp. Fl. Groen. 5 and 234; Rosenvinge, l. c. 654; Fowler, Pl. N. Bruns. 26; Knowlton, Proc. U. S. Nat. Mus. **1885**: 215; Steiner, l. c. 532; Coville, Cont. U. S. Nat. Herb. **3**: 338.

Potentilla argentina Huds. Fl. Ang. 195. 1762.

Gilib. Fl. Lith. **5**: 254.

Argentina vulgaris Lam. Fl. Fran. **3**: 119. 1778.

Dactylophyllum Anserina Spen. Fl. Frib. **3**: 1084.

Fragaria Anserina Crantz, Stirp. Aust. fasc. **2**: 9*; Ed. 2, 71*.

ILLUSTRATIONS: Morr. Hist. **1**²: pl. 20, f. 4; Sturm, Deutschl. Fl. **4**: pl. 7*; Eng. Bot. **12**: pl. 861; Fl. Dan. **4**: pl. 544; Dietr. Fl. Boruss. **2**: pl. 142*; Heyne, Arzneijer. **4**: pl. 31*; Thome, Fl. v. Deutschl. **3**: pl. 404; Sv. Bot. pl. 152*; Curt. Lond. **3**: pl. 3; Schrank, Fl. Monac. **4**: pl. 386*; Dreves, Bot. Bilderb. **1**: pl. 35*; Britt. & Brown, Ill. Fl. **2**: f. 1934. PLATE 98, f. 1; dissection of flower, f. 2; stamen, f. 3; pistil, side view, f. 4; the same seen from above, f. 5; fruiting hypanthium and calyx, f. 6.

Main stem almost none from perennial fascicled roots and producing numerous long runners. Leaves 1–2 dm. long, abruptly pinnate with 9–31 larger leaflets and smaller interposed, in the typical form spreading or flat on the ground, slightly silky and green above, white-silky and tomentose beneath; larger leaflets 1–3 cm. long, oblong, oblanceolate or obovate, deeply and sharply serrate with lanceolate or triangular teeth. Flowers 1–2.5 cm. in diameter, on pedicels 3–20 cm. long. Bractlets simple and lanceolate, or often broader, toothed or divided, generally a little longer than the broadly ovate sepals. Petals elliptic, often twice as long as the sepals. Achenes numerous, very thick and often grooved at the upper end.

A. Anserina grows on moist ground in the arctic and colder temperate regions of the northern hemisphere, extending in America from Greenland and Alaska to New Jersey and Northern California and in the mountain regions to New Mexico and Arizona. It has also been collected in Chile.

Argentina Anserina concolor (Ser.).

Potentilla Anserina concolor Ser. in DC. Prod. **2**: 582. 1825.

Lange, Consp. Fl. Groen. 234; Don, Gard. Diet. **2**: 559; Lehm. Rev. Pot. 189; Rydb. Bull. Torr. Bot. Club, **24**: 12.

Potentilla Anserina sericea Koch, Syn. 213. 1837.

Ledeb. Fl. Ross. **2**: 45; Walp. Ann. **2**: 513; Lehm. Del. Sem. Hort. Hamb. **1850**: 10.

Potentilla Anserina holosericea Gaud. Fl. Helv. **3**: 405. 1828.

Leaves silvery white-silky on both sides.

In America it is confined to the Rocky Mountain Region from the Mackenzie and Alaska to New Mexico. Specimens examined:

Northwest Territory: Miss E. Taylor.

Assiniboia: John Macoun, No. 10471, 1895.

Washington: Wilkes' Expedition, No. 92.

Oregon: J. S. Newberry (Williamson Exp.); Dr. Lyall, 1860; H. M. Cronkhite, 1864.

California: S. B. Parish, No. 3154, 1894; Fremont (2d Exp.).

Wyoming: H. Engelmann, 1856.

Colorado: John Wolf (Wheeler Exp.), No. 382, 1873; G. E. Osterhout, 1893.

New Mexico: E. Palmer, 1869; Friese.

Utah: M. E. Jones, No. 1453, 1880; L. F. Ward, No. 155, 1875.

Arizona: A. L. Anderson, 1863; Lemmon, 1884.

Argentina *Anserina grandis* (T. & G.).

Potentilla Anserina grandis Torr. & Gray, Fl. N. Am. **1**: 444. 1840.

Ledeb. Fl. Ross. **2**: 45; Lehm. Rev. Pot. 189; Del. Sem. Hort. Hamb. **1850**: 10; Lange, Consp. Fl. Groen. 5; Macoun, Cat. Can. Pl. 141; Rosenvinge, Fl. Groen. 655; Walp. Ann. **2**: 514.

Rydb. Bull. Torr. Bot. Club, **24**: 18.

Potentilla Pacifica Howell, Fl. N. W. Am. **1**: 179. 1898.

Leaves often 3-4 dm. long, erect; leaflets oblong, 4-7 cm. long.

Growing in grassy places and quite common in Washington and British Columbia, but extending into California and to the arctic regions. The following specimens have been examined:

Alaska: A. Kellogg, No. 190, 1867.

British Columbia: John Macoun, 1889.

Vancouver Island: Dr. Lyall, 1858; John Macoun, No. 178, 1893.

Washington: Wilkes' Exp., No. 72; Dr. Scouler, No. 218; T. Howell, 1885; W. N. Suksdorf, 1884.

Oregon: T. J. Howell, 1882.

California: H. N. Bolander; Mrs. R. M. Austin, No. 65, 1886.

Montana: Flodman & Rydberg, 1895; F. V. Hayden, No. 130, 1854.

Utah: Watson, No. 340, 1869.

Newfoundland: Robinson & Schrenk, No. 42, 1894.

Greenland: Komerup;* Hartz.*

6. COMARUM L.

Comarum L. Sp. Pl. 502. 1753.

Pancovia Heist; Adans. Fam. 2: 294. 1763.

Potentilla Scopoli, Fl. Carn. Ed. 2, 359. In part. 1772.

Argentina Lam. Fl. Franç. 3: 118. In part. 1778.

Hypanthium almost flat, or slightly saucer-shaped, enlarging in fruit, more or less tinged with red. Bractlets, sepals and petals 5. Petals red, ovate, acuminate. Stamens 20–25, inserted near the base of the receptacle; filaments filiform, but rather stout; anthers flat, cordate at the base, attached by the back, and opening by longitudinal marginal slits. Receptacle hemispherical, enlarging in fruit and becoming ellipsoid and spongy. Pistils numerous; style lateral, filiform. Seeds amphitropous.

Only one species.

1. *Comarum palustre* L.

Comarum palustre L. Sp. Pl. 502. 1753.

L. Sp. Pl. Ed. 2, 718; Mueller, Fl. Dan. *pl.* 636; Mill, Gard. Diet. Ed. 8; Ait. Hort. Kew. 2: 219; Ed. 2, 3: 282; Willd. Sp. Pl. 2: 1119; Pers. Syn. 2: 58; Poir. in Lam. Enc. Meth. Suppl. 2: 316; Don, Gard. Diet. 2: 562; Dietr. Syn. Plant. 3: 194.

Michx. Fl. Bor. Am. 1: 302; Pursh, Fl. Am. Sept. 356; Bigelow, Fl. Bost. 123; Ed. 2: 203; Pl. Bost. 216; Nutt. Gen. 1: 311; Torr. & Gray, Fl. N. Am. 1: 447; Eat. Man. Ed. 2: 210; Ed. 3: 245; Ed. 5: 182; Ed. 6: 103; Ed. 7: 253; Torr. Fl. N. Y. 1: 211; Eat. & Wr. N. Am. Bot. 204; Gray, Man. 123; Newberry, Pac. R. R. Rep. 6: 71; Cooper, *ibid.* 12: Book 2, 56; Britt. & Brown, Ill. Fl. 2: 217; Howell, Fl. N. W. Am. 1: 174.

Richards. Frankl. Journ. 739; Ed. 2, Suppl. 12; Ledeb. Fl. Ross. 2: 62; Seem. Bot. Herald, 29; Hook. f. Aret. Pl. 290; Provancher, Fl. Can. 190.

Potentilla palustris Scop. Fl. Carn. Ed. 2: 359. 1772.

Lehm. Mon. Pot. 21 and 52; Sprengel, Syst. Veg. 2: 536; Lehm. Rev. Pot. 73; Walp. Ann. 2: 483.

Torr. Fl. U. S. 498; Comp. 211; Gray, Man. Ed. 2: 119; Ed. 5: 155; Wood, Bot. & Fl. 107; Torr. Wilkes' Exp. 290; Knowl. Proc. U. S. Nat. Mus. 1885: 215; Stejneger, *ibid.* 532; Wats. Proc. Am. Acad. 8: 560; Brew. & Wats. Bot. Cal. 1: 180;

Wats. & Coult. in Gray, Man. Ed. 6: 160; Greene, Fl. Fran. **1**: 63; Coville, Cont. U. S. Nat. Herb. **3**: 339; Holz. *ibid.* 223; Bailey, in Gray, F. F. & G. Bot. Rev. Ed. 152.

Lehm. in Hook. Fl. Bor. Am. **1**: 187; Schlecht. Linnaea, **10**: 98; E. Meyer, Pl. Lab. 77; Macoun, Cat. Can. Pl. 140; Lange, Consp. Fl. Groen. 3 and 234; Rosenvinge, *ibid.* 654.

Argentina rubra Lam. Fl. Fran. **3**: 120. 1778.

Potentilla Comarum Nestler, Mon. Pot. 24 and 36. 1814.

Ser. in DC. Prod. **2**: 583; Cham. Linnaea, **2**: 25; Bong. Veg. Ins. Sitcha, 132; Beck, Bot. 108; Ed. 2, 100.

Potentilla rubra Haller f. in Ser. Mus. Helv. **1**: 56*. Not Willd.

Fragaria palustris Crantz, Stirp. Aust. fasc. **2**: 11*.

Comarum rubrum Gilib. Fl. Lith. **5**: 255*.

Fragaria pinnatifolia Stokes, Bot. Mat. Med. **3**: 149.

ILLUSTRATIONS: Fl. Dan. **4**: *pl.* 636; Svensk. Bot. *pl.* 310; Engl. Bot. **3**: *pl.* 172; Schkuhr, Handb. **2**: *pl.* 138; Dietr. Fl. Boruss. **12**: *pl.* 824*; Thome, Fl. Deutschl. **4**: *pl.* 409; Baxter, Brit. Phan. Bot. **3**: *pl.* 197; Britt. & Brown, Ill. Fl. **2**: 1937. PLATE 99, *f.* 1-2; dissection of flower, *f.* 3; section of receptacle in fruit, *f.* 4; stamen, *f.* 5; young pistil, *f.* 6; mature pistil, *f.* 7.

Perennial with a creeping rootstock; stem ascending, 2-5 dm. high, subglabrous or appressed-strigose, somewhat striate, brownish or reddish in color and shining, the lower stipules brown, scarious and wholly adnate to the petiole, the upper also adnate but with free tips, lanceolate or ovate and foliaceous. Basal leaves with petioles about 1 dm. long, the upper subsessile, all pinnate with two or three pairs of more or less approximate leaflets, minutely silky-strigose, shining, green above, paler and purple-veined beneath; leaflets oblong, oblanceolate, or even obovate, sharply serrate. Cyme leafy. Hypanthium and calyx in flower scarcely 1 cm. in diameter, in fruit over 2 cm., silky-strigose. Petals, stamens, styles and the inner side of the sepals dark purple. Bractlets narrowly lanceolate, scarcely half as long as the broadly ovate acuminate sepals. Petals ovate, acuminate or acute, scarcely half as long as the sepals. Stamens 20-25.

Comarum palustre grows in cold wet places, especially sphagnum bogs, and extends in America from Greenland to New Jersey, northern Illinois, Montana, northern California and Alaska. It is also found in northern Europe and Asia.

***Comarum palustre villosum* Pers.**

Comarum palustre villosum Pers. Syn. **2**: 58. 1807.

Potentilla palustris villosa Walp. Ann. **2**: 483; Lehm. Rev. Pot. 74; Lange, Consp. Fl. Groenl. 3.

ILLUSTRATION: Pluken. Phyt. **2**: *pl. 212, f. 2*.

Lower; leaves villous above, subtomentose beneath.

Greenland, according to Lehmann.

7. DUCHESNEA J. E. Smith.

Fragaria Andr. Bot. Rep. *pl. 479*. 1811.

Duchesnea J. E. Smith, Trans. Linn. Soc. **10**: 372. 1811.

Hypanthium almost flat. Bractlets, sepals and petals normally 5. Petals yellow, oblong-cuneate, truncate or rarely slightly emarginate; sepals ovate, acuminate, about equalling the petals; bractlets large, 3-5-toothed, generally exceeding both petals and sepals. Stamens 20-25, rather short, closely surrounding the receptacle; anthers opening by a longitudinal slit. Receptacle hemispheric, bearing numerous pistils, in fruit becoming fleshy and red, but insipid in taste. Style filiform, attached to the middle of the ovary, scarcely deciduous. Seeds ascending and amphitropous.

The genus consists of two species, natives of India, but one is introduced into most parts of the tropical and warmer temperate zones. The flowers are borne on long pedicels from the axils of the leaves of the long flagelliform and often rooting branches.

1. *Duchesnea Indica* (Andr.) Focke.

Fragaria Indica Andr. Bot. Rep. *pl. 479*. 1811.

Ait. Hort. Kew. Ed. 2, **3**: 273; Spreng. Syst. **2**: 533; Dietr. Syn. Pl. **3**: 177; Spach, Hist. Nat. **1**: 469; Lindl. Bot. Reg. **1**: 61; Walp. Rep. **2**: 26.

Wood, Class Book, **1863**: 341; Eastwood, Zoe, **4**: 286; Gray, Man. Ed. 5, 156; Wats. & Coult. in Ed. 6, 158; Bailey in Gray, F. F. & G. Bot. Rev. Ed. 153.

Duchesnea fragarioides J. E. Smith, Trans. Linn. Soc. **10**: 373. 1811.

Duchesnea fragiformis D. Don, Prod. Fl. Nep. 233.

Fragaria Roxburghii Wight. & Arn. Prod. 300*.

Duchesnea Indica Focke in Engl. & Prantl, Nat. Pfl. Fam. **3**: abt. 3, 33. 1888. Britt. & Brown, Ill. Fl. **2**: 208.

ILLUSTRATIONS: Britt. & Brown, Ill. Fl. **2**: *f. 1912*; Andr. Rep. **7**: *pl. 479*; Lindl. Bot. Reg. **1**: *pl. 61*; Wright, Ic. Pl. Ind. Or. **3**: 989*; Schrank, Hort. Monac. *pl. 50**.

Stems coarsely strigose. Leaves not very thick, glabrate above, silky-strigose beneath; leaflets 2-4 cm. long, rhombic-obovate, coarsely crenate, generally more or less petioled. Flowers 1.5-2 cm. in diameter; fruit about 1 cm. in diameter; achenes superficial.

It has become fairly well established in the Southern States, as far north as Pennsylvania, and has been introduced into California.

Texas : G. C. Nealley, No. 58.

Louisiana : J. F. Joor, 1874.

Alabama : A. Winchell, No. 159 ; W. Trelease, 1879 ; Earle & Underwood, 1896 ; B. F. Saurman.

Florida : Geo. V. Nash, No. 2523, 1895 ; A. H. Curtiss, No. 780.

Georgia : A. H. Curtiss, 1875 ; Durand, 1837.

North Carolina : G. R. Vasey, 1878 ; W. M. Canby, 1876.

Virginia : Britton & Small, 1893 ; N. L. Britton, 1892.

District of Columbia : Mrs. Stevens, 1893.

Pennsylvania : W. M. Canby, 1865 ; J. K. Small, 1889 ; Miss E. G. Knight, 1884
Small & Heller, 1891 ; C. E. Smith, 1866.

New Jersey : F. E. Lloyd, 1890.

Missouri : B. F. Bush, 1892.

8. FRAGARIA L.

Fragaria L. Sp. Pl. 494. 1753.

Dactylophyllum Spenn. Fl. Frib. 3 : 1084. In part. 1829.

Hypanthium almost flat. Bractlets, sepals and petals, normally 5. Petals white, or in one species reddish, broadly obovate, elliptic or almost orbicular, obtuse, never emarginate. Stamens about 20, in three series as in *Potentilla*, sometimes abortive, closely surrounding the base of the receptacle ; filaments short ; anther dehiscent by a longitudinal slit. Receptacle hemispheric or conic, bearing very numerous pistils, in fruit becoming enlarged, very juicy and delicious in taste. Style filiform but rather short, attached near the middle of the ovary, scarcely deciduous. Seeds ascending and amphitropous.

The genus consists of perhaps 40 species, natives of Europe, Northern Asia, North America, India and South America. Many species are cultivated for their delicious fruit (the receptacle). They are mostly low plants with a short scaly rootstock and rather numerous, generally trifoliate basal leaves. The flowering stem is mostly scapose, but some species have one or two stem leaves ; these may be similar to the basal leaves, but with shorter petioles, or else only unifoliate and more or less reduced. The plants propagate by true runners. The flowers of several species have a tendency to become polygamo-dioecious.

The origin of most of our cultivated varieties is to be traced from *F. Chilensis* either directly or through hybridization. Some have been derived from *F. grandiflora* from Surinam, *F. elatior* and *F. vesca* from Europe, and *F. Virginiana*, a native of the Eastern United States. Many of the varieties generally supposed to have been derived from the latter, must, however, have had their origin from *F. Chilensis*.

The species of the genus *Fragaria* are very closely related to each other, and it is very often difficult to distinguish them from each other. The number that has generally been recognized for the United States is four, and for Mexico one, but the number is, however, without doubt much larger. Until lately only two species were supposed to grow in the Atlantic States, and four in the Pacific States. The so-called *vesca* and *Virginiana* of the two regions are so unlike that it is impossible that they can be the same species, and the true *F. vesca* L. is not a native of America. The *Fragarias* of the Rocky Mountain region have been in such confusion that the names they bear on herbarium labels are hardly ever correct. The trouble has been that altogether too small a number of species has been recognized. The only reasonable treatment of the genus is to acknowledge about 20 species in North America, for should a smaller number be recognized the question would arise as to how to dispose of the numerous intermediate forms.

I have endeavored to arrange the species in natural groups in somewhat the same way as the arrangement adopted in *Potentilla* and *Horkelia*, but all these attempts were in vain on account of the close relationship of the members of the proposed groups. The general arrangement that is found in manuals and monographs consists in dividing the genus into two series, one with superficial achenes, the other with the achenes set into pits. This will not do for the North American plants, for in some species, as for instance in *F. Chilensis* and *F. Californica*, the pits are very shallow. The latter, although with evident pits, is a rather close relative of the European *F. vesca* and *F. collina*, both of which have superficial achenes.

The pubescence of the scape and petioles has been used to distinguish related species, even between groups. In some species the pubescence on these parts is appressed or slightly spreading, in others it is spreading nearly at right angles to the stalk or even somewhat reflexed. Although this is not a reliable character in all cases, it has been employed by me in this work in the key to the species, as it is in most cases a very convenient one; it must, however, be remembered that the key is artificial, and too much stress should not be laid upon it. The general description will give a better and more reliable definition than the key affords.

Fragaria Chilensis, *F. grandiflora*, and *F. Carolinensis*¹ constitute a very natural group with very large flowers and thick and rather coriaceous leaves which are strongly veined and are more or less puberulent under the long silky hairs on the lower surface. *F. cuneifolia* Nutt., however, agrees perfectly with this group, except in being of a much smaller size and having very small flowers. *F. crinita* (*F. Chilensis* var. *Scouleri* Wats., in part) has

¹ This is not, as may be supposed, a native of Carolina. Its origin is entirely obscure. It may be a hybrid between either of the other two species and *F. Virginiana*, or simply a garden form perhaps derived from *F. Chilensis*.

the flowers of this group, but the leaves are generally rather thin, and the plant stands otherwise nearer to *F. Californica* than to *F. Chilensis*. Thinner leaved forms of *F. Chilensis*, which frequently occur, approach *F. platypetala* n. sp. (*F. Virginiana* of western botanists). The latter is sometimes quite hard to distinguish from *F. bracteata* Heller (*F. vesca* of the Pacific coast botanists), and hence connects the groups of *Fragariae* with pitted fruit with those with superficial achenes. Another connecting link is formed by *F. pumila*, which approaches *F. Mexicana*.

It has therefore seemed best to abandon all division into groups and to arrange the species in the following artificial key :

KEY TO THE SPECIES.

Flowers erect or spreading, nodding only in fruit, white.

Leaves thick and coriaceous, silky and tomentulose beneath.

Leaflets cuneate ; flowers 1.5–2 cm. in diameter.

Pubescence spreading.

1. *F. cuneifolia*.

Pubescence appressed.

[19. *F. firma*.]

Leaflets broadly obovate, the lateral ones very oblique ; flowers 2–3.5 cm. in diameter.

Leaves generally very thick, strongly reticulate beneath.

2. *F. Chilensis*.

Leaves thinner, not strongly reticulate.

3. *F. crinita*.

Leaves generally thin, not at all tomentulose.

Pubescence of scape and petioles divaricate, *i. e.*, generally spreading at right angles or somewhat reflexed (scanty and less spreading in No. 8).

Leaves densely silky beneath ; fruit slightly pitted.

Flowers over 2 cm. in diameter.

3. *F. crinita*.

Flowers 1–1.5 cm. in diameter.

Leaflets broadly rounded or rhombic-ovate.

4. *F. Californica*.

Leaflets oblong-obovate or cuneate.

5. *F. Mexicana*.

Leaves slightly silky beneath, in age glabrate.

Leaflets subsessile ; achenes superficial.

Leaves somewhat firm, never glaucous ; fruit inclined to be hemispheric.

6. *F. vesca*.

Leaves very thin, often somewhat glaucous ; fruit inclined to be ovoid or sub-conic.

Calyx in fruit spreading ; scape generally with long divaricate hairs and a leafy bract ; flowers 1.5–2 cm. in diameter.

7. *F. bracteata*.

Calyx in fruit reflexed ; scape slightly silky or glabrate, generally without a leafy bract ; flowers less than 1.5 cm. in diameter.

8. *F. Americana*.

Leaflets generally petiolate ; achenes set in deep pits (in Nos. 9 and 10 unknown).

Leaflets 3–7-toothed at the apex only, generally only the terminal one petiolate.

9. *F. sibbaldifolia*.

Leaflets several-toothed all around except the lowermost portion.

Sepals and bractlets ovate. 10. *F. truncata*.

Sepals and bractlets lanceolate.

Fruit hemispheric.

Plant more or less glaucous ; petals generally orbicular and twice as long as the sepals. 11. *F. platypetala*.

Plant not glaucous ; petals elliptic, generally exceeding the sepals by one-half. 12. *F. Virginiana*.

Fruit oblong-conic. 13. *F. Canadensis*.

Pubescence of the scape and petioles appressed or slightly spreading ; achenes in pits.

Plants not glaucous.

Leaflets generally over 3 cm. long, very veiny beneath. 14. *F. prolifica*.

Leaflets generally 1-3 cm. long, not very veiny ; runners few.

Scape and petioles densely grayish-strigose ; western. 15. *F. pumila*.

Scape and petioles slightly hairy, glabrate ; eastern. 16. *F. Terrae-Novae*.

Plants more or less glaucous.

Leaves rather thin.

Leaflets obovate ; scape several-flowered. 17. *F. glauca*.

Leaflets oblong-cuneate ; scape 1-4-flowered. 18. *F. pauciflora*.

Leaves rather thick, firm ; leaflets oblong-cuneate. 19. *F. fima*.

Flowers pinkish, nodding from the beginning ; achenes superficial. 20. *F. Helleri*.

1. *Fragaria cuneifolia* Nutt.

Fragaria Chilensis var. Torr. & Gray, Fl. N. Am. 1: 448. 1840. Not Molina.

Fragaria cuneifolia Nutt. *ibid.*, as synonym ; Howell, Fl. N. W. Am. 1: 174.

Rootstock short but not very thick. Leaves rather few, firm and somewhat coriaceous, but not as thick as in *F. Chilensis* and scarcely reticulate, silky above when young, glabrate in age, densely silky and slightly tomentulose beneath ; stipules lanceolate, brown, scarious ; petioles slender, covered with long silky spreading or reflexed hairs ; leaflets cuneate to obovate, obtuse or truncate, toothed only at the apex with the middle tooth often smaller, 1.5-4 cm. long, subsessile or the middle one slightly petioled ; the lateral ones only slightly oblique. Runners long and slender. Scape slender, less than 1 dm. high, with spreading or reflexed long hairs, few-flowered, without foliaceous bracts. Flowers 1.5-2 cm. in diameter ; bractlets and sepals lanceolate ; petals obovate-cuneate, a third longer than the sepals. Fruit hemispheric, about 1 cm. in diameter, more villous than in the other species ; achenes superficial, or set in shallow pits.

F. cuneifolia is nearest related to *F. Chilensis* and has generally been included in that species, but differs by its smaller flowers, its more hairy fruit, its narrow and scarcely oblique leaflets, its slender habit and more scanty and more spreading hairs on the scape

and petioles. The specimens collected by Henderson approach *F. Chilensis*. Some depauperate specimens of a *Fragaria* have been collected by Miss I. Mulford, at Ketchum, Idaho, 1892; whether they should be referred here or to *F. truncata* or belong to a distinct species, can not be decided; in general habit, size of the plant and form of the leaves, they most resemble the present species, but the form of the sepals and bractlets and the texture of the leaves place them near *F. truncata*.

Oregon: Nuttall (Type, Columbia herb.).

Washington: (Falcon Valley), W. N. Suksdorf, No. 486, 1883.

Vancouver Island: John Macoun, 1887.

Idaho: Henderson, No. 2868, 1894.

2. *Fragaria Chilensis* (L.) Duchesne.

Fragaria vesca var. *Chilensis* L. Sp. Pl. 495. 1753.

L. Sp. Pl. Ed. 2: 709; Ait. Hort. Kew. 2: 211.

Fragaria Chilensis Duchesne, Hist. Nat. Frais. 165. 1766.

Mill. Gard. Diet. No. 4; Lam. Enc. Meth. 2: 537; Willd. Sp. Pl. 2: 1092; Ehrh. Beitr. 7: 26; Persoon, Syn. Pl. 2: 53; Ait. Hort. Kew. Ed. 2, 3: 272.

Fragaria grossa Salisb. Prod. 363*.

Fragaria sericea Dougl. in Hook. Fl. Bor. Am. 1: 185. 1833.

Fragaria Bonariensis Pers. Syn. 2: 53. 1807.

?*Fragaria Caroliniensis* Duch. in. Lam. Enc. 2: 539. (Probably a hybrid.)

Fragaria Chilensis Molina, Sagg. Chile, 134*.

Spreng. Syst. 2: 533; Seringe in DC. Prod. 2: 571; Cham. & Schl. Linnaea, 2: 20; Don, Gard. Diet. 2: 545; Dietr. Syn. Pl. 3: 177; Gay, Fl. Chil. 2: 305; J. Gay, in Ann. Sc. Nat. (IV.) 8: 200; Decaisne, Jard. Fruit. Mus. Frag. 52*; Walp. Rep. 2: 25.

Eat. Man. Ed. 7, 306; Torr. & Gray, Fl. N. A. 1: 448. Eat. & Wright, N. A. Bot. 246; Wood, Class Book, 253; Torr. Pac. R. R. Rep. 4: 85; Bot. Mex. Bound. Surv. 64; Newberry, Pac. R. R. Rep. 6: 73; Cooper, *ibid.* 12: 3, 56; Torr. Bot. Wilkes' Exp. 290; U. S. Expl. Exp. 1: 500; Wats. Bot. Cal. 1: 177; Hook. & Arn. Bot. Beechey, 140; K. Bandegge, Zoe, 2: 349; Greene, Fl. Fran. 1: 70; Man. Bay Reg. 177; Behr, Fl. Vic. San Fran. 248; Meehan, Proc. Acad. Sci. Phila. 1884: 82.

Hook. Fl. Bor. Am. 1: 185; Prov. Fl. Can. 1: 187; Macoun, Cat. Can. Pl. 1: 135. F. Kurtz, Engl. Bot. Jahrb. 19: 373; Bailey, in Gray, F. F. & G. Bot. Rev. Ed. 153.

ILLUSTRATIONS: Fox, Rev. Hortie. 1853: *pl.* 2*; Decaisne, Jard. Fr. Mus. Frag. 52, *pl.*

Rootstock short and thick, crowned with rather numerous leaves and large, scarious brown stipules 1–2 cm. long. Petioles 2–20 cm. long, stout, brownish, rather densely silky, with appressed or ascending, seldom spreading hairs. Leaves very thick and coriaceous, brownish when mature, slightly silky above when young, but perfectly glabrous in age, strongly nerved and reticulated, densely silky-strigose and finely tomentulose beneath; terminal leaflet evidently petiolate, broadly obovate, truncate, sub-obcordate or sometimes rounded at the apex and crenate above the middle, with the terminal tooth generally much smaller, 2–5 cm. long; lateral leaflets similar, but somewhat smaller, short-petiolate or subsessile and very oblique at the base; runners strong, often .5 m. long; scape in the common form generally low, less than 1 dm. high, branched near the base and without a leafy bract, always densely silky-strigose. Flowers 2–3.5 cm. in diameter. Hypanthium, sepals and bractlets silky-strigose; bractlets and sepals oblong or lanceolate, acute or acuminate. Petals broadly obovate, exceeding the sepals by about a half. Fruit hemispheric, 1.5–2 cm. in diameter, quite hairy; achenes nearly superficial, set in shallow pits.

F. Chilensis is distinguished from all American strawberries by the very thick and strongly reticulated leaves and from all except the next species by the size of the flowers. It is a native of the Pacific slope of America, extending from Alaska to Patagonia; it is also found on the Sandwich Islands and is cultivated in many parts of the world.

California: J. M. Bigelow (Whipple Exp.), 1853–4; Rev. A. Fitch; M. E. Jones, No. 3252, 1882; Wilkes' Exp. No. 263; Munson & Hopkins, 1889; Kellogg & Harford, No. 214, 1868; C. C. Parry, 1868; Bolander, 1864; Geo. Engelmann, 1880; Fritchey, No. 9, 1889; Thurber, No. 467, 1852; Michener & Bioletti, 1892–3; J. Tidestrom, 1894; Alice Eastwood, 1896; T. S. Brandegee, 1890.

Oregon: G. Engelmann, 1880; Miss I. Mulford, 1892; J. S. Newberry (Williamson's Exp.); Wilkes' Exp., No. 1468, 1838–42; Drake & Dickson, 1886.

Washington: W. N. Suksdorf, No. 2493, 1886.

Sandwich Islands: Wilkes' Exped., 1838–42; Mann & Brigham, No. 424.

Nevada?: (Crescent City) W. H. Shockley, 1879.

***Fragaria Chilensis* Scouleri (Wats.).**

Fragaria Chilensis β Hook. Fl. Bor. Am. 1: 185. 1833.

Torr. & Gray, Fl. N. A. 1: 448.

Fragaria Chilensis var. *Scouleri* Wats. Bib. Ind. 282. In part. 1878.

Macoun, Cat. Can. Pl. 1: 135.

Fragaria Chilensis Coville, Cont. U. S. Nat. Herb. 3: 338. 1895.

Scape 1–3 dm. high with a petioled unifoliate leafy bract; pubescence more spreading and leaves long-petioled.

In the extreme forms very unlike the common *F. Chilensis*, but running into it.

California: A. A. and Gertrude Heller, 1896.

British Columbia: John Macoun, 1889; Scouler.

Alaska: F. Funston, No. 2, 1892; W. H. Dall, 1874; Thos. Meehan, 1883.

Oregon: F. E. Lloyd, 1894.

3. *Fragaria crinita*.

Fragaria Californica Newberry, Pac. R. R. Rep. 6: part 2, 73. 1857. Not Cham.

Fragaria Chilensis var. *Scouleri* Wats. Bibl. Ind. 282. In part.

Rootstock short and thick, but not so much so as in *F. Chilensis*. Leaves firm but much thinner than in that species, less veiny beneath and scarcely reticulate, silky above when young, in age glabrate, densely silky and somewhat tomentulose beneath; petioles slender, 2–10 cm. long, covered with spreading or reflexed, long white silky hairs; leaflets all subsessile, rhombic-obovate, the lateral oblique at the base, more sharply toothed than in *F. Chilensis*, and the terminal tooth seldom much smaller than the others. Runners slender and long. Scape seldom over 1 dm. high, with spreading long silky hairs, slender, seldom with leafy bracts. Flowers 2–3 cm. in diameter. Hypanthium silky; bractlets and sepals silky, narrowly lanceolate, acuminate. Petals obovate, exceeding the sepals by about a third. Fruit hemispheric, nearly 1 cm. in diameter, somewhat pubescent; achenes in shallow pits.

F. crinita is almost intermediate between *F. Chilensis* and *F. Californica* and has been confused with both. It may be of hybrid origin. The texture of the leaves is intermediate between that of the others, much thinner and sharper toothed than in *F. Chilensis*, but much firmer than in *F. Californica*. The habit is that of the latter and so is the form of the sepals and bractlets, but the size of the flower is as in the former. The pubescence of the scape and petioles is much more spreading than in *F. Chilensis* and longer and denser than in *F. Californica*. A specimen collected by Nuttall on the Columbia has thin leaves and smaller flowers; it is doubtful whether this should be referred here or to *F. Californica*.

Washington: Wilkes' Exped.

Oregon: T. J. Howell, 1882; J. S. Newberry (Williamson's Exp.); Wilkes' Exped., No. 440, 1838–42.

California: Geo. Thurber, No. 475, 1852; Oreutt, 1889; Brandegee.

4 *Fragaria Californica* Cham. & Schl.

Fragaria California Cham. & Schl. *Linnaea*, 2 : 20. 1887.

Wats. Bot. Cal. 1: 177; Hook & Arn. Bot. Beechey, 140; K. Brandegee, *Zoe*, 2 : 349; Greene, *Pittonia*, 2 : 262; Fl. Fran. 1 : 70. Man. Bay Reg. 187; Behr, Fl. Vie. San Fran. 248.

Fragaria vesca var. γ Torr. & Gray, Fl. N. A. 1: 448. In part.

Fragaria vesca Benth. Pl. Hartw. 309.

Gray, Pl. Fend. 42, 1849; Torr. Pac. R. R. Rep. 4 : 85 (in part; Calif. spec.); Bot. Mex. Bound. Surv. 64.

Fragaria lucida Vilmorin; Gay, Ann. Sci. Nat. (IV.) 8 : 201; Gard. Chron. 1858 : 877; Decaisne, Jard. Fruit. Mus. Frag. 58, *pl.*

Rootstock short but not very thick, crowned by several rather thin leaves. Stipules ovate-lanceolate, brown; petioles slender, 3–10 cm. long, sparingly covered with long white silky spreading or reflexed hairs; terminal leaflet 2–5 cm. long, rounded-ovate, obtuse, coarsely serrate, subsessile, glabrate above, appressed-silky beneath; lateral ones similar but very oblique at the base. Runners long and slender. Scapes generally several, 2–5-flowered, slender, silky with spreading or reflexed hairs, generally less than 1 dm. high and seldom leafy-bracteate. Flowers 1–1.5 cm. in diameter. Hypanthium silky; bractlets generally somewhat shorter than the sepals, both silky, lanceolate and acuminate or acute; petals obovate, very little exceeding the sepals. Fruit hemispheric, 1–1.5 cm. in diameter; achenes in shallow pits.

It is nearest related to *F. vesca* and *F. Mexicana*. From the former it differs by the more rounded leaves and the pubescence which is much longer and thicker especially on the under surface of the leaves, and from the latter by the larger and broader leaflets, the more numerous leaves and scapes. It is the most common strawberry in California, extending eastward into New Mexico.

California : J. M. Bigelow, Whipple Exp., 1853–4; C. C. Parry (Mex. Bound. Surv.), 1850; J. Torrey, No. 124, 1865; S. B. Parish, No. 8368, 1892; No. 3404, 1894; W. L. Jepson, 1891; H. W. Henshaw, No. 182, 1893; C. R. Orcutt, 1889; S. B. & W. F. Parish, No. 404, 1882; Geo. Hansen, No. 8302, 1895, and 298, 1893; *Hartweg, No. 8785; Ed. Palmer, No. 82, 1875; B. F. Seeds, No. 2388; Mrs. R. M. Austin, No. 840, 1893; Alice Eastwood, 1893; 1895; Blankinship; W. Price; H. Davis, 1887.

New Mexico : A. Fendler, No. 207, 1847; Dr. Edwards, 1860; E. O. Wooton, 1895 (White Mts.).

Arizona : J. W. Toumey.

Lower California : T. S. Brandegee, 1893.

Fragaria Californica Franciscana.

Low, from a very thick rootstock; leaves thicker, smaller, and strongly veined.

This is very unlike the typical *F. Californica* in general habit, but as I can not find any technical characters by which to separate it from the species, and as I do not know it from field observations, I have thought it best not to describe it as a distinct species.

Californica: (Marin Co.) Alice Eastwood, 1896; (Mt. Tamalpais) T. S. Brandegee, 1890; both in the herbarium of the California Academy of Sciences.

5. Fragaria Mexicana Schlecht.

Fragaria Mexicana Schlecht. *Linnaea*, **13**: 265. 1839.

Hemsley, *Biol. Cent. Am.* **1**: 375; *Dietr. Syn. Pl.* **3**: 177; *Walp. Rep.* **2**: 25.

Fragaria vesca Seem. *Bot. Voy. Herald*, 282. Not L.

Rootstock very short, crowned by a few leaves and a solitary scape. Leaves rather thin, soon glabrate above, silky beneath; petioles about 5 dm. long, slender, silky with spreading or reflexed hairs; leaflets oblong-obovate or cuneate, coarsely serrate, 2–3 cm. long, the lateral ones oblique at the base, but less so than in *F. Californica*. Runners long and slender. Scape generally about 5 cm. high, seldom over 10 cm. high, with spreading silky hairs, slender and 1–4-flowered. Flowers seldom over 1 cm. in diameter. Sepals and bractlets lanceolate and silky, as also the hypanthium. Petals obovate, a little exceeding the sepals. Fruit sub-hemispheric, .75–1 cm. in diameter; achenes superficial.

F. Mexicana is most nearly related to *F. Californica*, from which it only differs in the smaller size, the narrower leaflets, the fewer leaves and the solitary scape. It much resembles the European *F. collina* from which it is easily distinguished by the spreading, not connivent fruiting sepals. If not in fruit it may be confounded with the quite similar *F. pumila*; it differs, however, in the more slender scape and petioles and their spreading pubescence. It is a native of Mexico.

Mexico: F. Müller, Nos. 1355 and 1544, 1853; Dr. J. Gregg, No. 696, 1849; C. G. Pringle, No. 4160, 1892; Edw. Palmer; *Seemann, No. 2178; *Liebman; *Coulter, No. 94; *Schiede; *Ehrenberg; Edw. Palmer, No. 313, 1885; No. 326, 1880; E. W. Nelson, No. 197, 1894.

Lower California: T. S. Brandegee, No. 203. 1890.

6. Fragaria vesca L.

Fragaria vesca L. *Sp. Pl.* 494. 1753.

L. Sp. Pl. Ed. 2: 708. *Ait. Hort. Kew.* **2**: 211; *Willd. Sp. Pl.* **2**: 8090; *Persoon, Syn. Pl.* **2**: 53; *Ait. Hort. Kew. Ed. 2, 3*: 271; *Spreng. Syst.* **2**: 533; *Seringe in DC. Prod.* **2**: 569; *Don, Gard. Diet.* **2**: 542; *Dietr. Syn. Pl.* **3**: 176. *Spach, Hist. Nat.* **1**: 465; *Vilmorin, Jard. Fruit. Mus.* **1**, *t*.*; *Decaisne, Jard. Fruit. Mus. Frag.* **27**, *t*.*

Eat. Man. Ed. 2, 249; *Ed. 3*, 282; *Ed. 5*, 220; *Ed. 6*, 148; *Ed. 7*, 306; *Beck, Bot.* **105**; *Ed. 2*, 98; *Torr. & Gray, Fl. N. A.* **1**: 448; *Eat. & Wright, N. A. Bot.* **246**; *Gray,*

Man. Ed. 5, 156; Wats. & Coult. Ed. 6, 158; Bailey, in Gray, F. F. & G. Bot. Rev. Ed. 152; Britt. & Brown, Ill. Fl. 2: 207.

Prov. Pl. Can. 1: 186 (in part); Macoun, Cat. Can. Pl. 1: 135 (in part).

Potentilla vesca Scop. Fl. Carn. Ed. 2, 1: 363. 1772.

Fragaria vulgaris Ehrh. Beitr. 7: 21. 1792.

ILLUSTRATIONS: Britt. & Brown, Ill. Fl. 2: *f.* 1910; Lam. Ill. *pl.* 442; Sturm, Fl. Deutschl. 2: *pl.* 2*; Schrank, Fl. Monog. 1: *pl.* 39*; Dietr. Fl. Bor. 5: *pl.* 318*; Sv. Bot. *pl.* 16; Engl. Bot. 22: *pl.* 1524; Baxter, Brit. Bot. 4: *pl.* 242; Fl. Dan. 13: *pl.* 1235; Agardh, Syst. *pl.* 14*; Decaisne, Jard. Fruit. *pl.* 1; Thome, Fl. Deustehl. 3: *pl.* 108; Hayne, 4: *pl.* 26*.

Rootstock short and thick. Leaves rather thin, short, silky when young, but glabrate on both sides in age; petioles somewhat stouter than in the related species, often 1-2 dm. long, silky with spreading hairs; leaflets rhombic-obovate, mostly acute, 2-10 cm. long, coarsely serrate, often short-petiolate, especially the terminal one. Runners long and slender. Scape often as high as the leaves, often with a foliaceous bract similar to the leaflets, several-flowered, silky with spreading hairs, but the pedicels, however, appressed-hairy. Flowers 1-1.5 cm. in diameter; sepals and bractlets from ovate to lanceolate, acute, slightly silky. Fruit generally subhemispheric, 1-1.5 cm. in diameter, red or seldom whitish; achenes superficial.

F. vesca is a native of the Old World, extensively cultivated and found occasionally escaped in the Eastern States. It is not a native of this continent, and the wild plant known under that name is *F. Americana*. From this *F. vesca* differs in the stouter habit, stouter and more hairy scape, the foliaceous bracts often present, thicker leaves with less sharp serrations, and the fruit which has a tendency to be hemispheric.

Pennsylvania: A. A. Heller and Gertrude Halbach, No. 903, 1893; A. P. Garber, 1870; John K. Small, 1889; Heller, 1889.

New York: E. B. Miller, 1885; N. L. Britton, 1891.

New Jersey: Geo. V. Nash, No. 1, 1893.

Ohio: A. E. Ricksecker, 1895.

Minnesota: J. C. Kassube, 1878.

***Fragaria vesca alba* (Ehrh.).**

Fragaria vulgaris var. *alba* Ehrh. Beitr. 7: 22. 1792.

Fruit straw-color or light pink; hairs of petioles and scape shorter and leaflets more rhomboid.

In the mountains of Pennsylvania, it behaves as a native and may be distinct from

F. vesca, but the differences are so trifling, that they do not warrant making it a species. It is not related to the native *F. Americana*.

Pennsylvania: R. N. Davis, 1894; J. A. Graves, 1895.

7. *Fragaria bracteata* Heller.

Fragaria vesca γ Torr. & Gray, Fl. N. A. 1: 448. In part. 1840.

Fragaria vesca Hook. Fl. Bor. Am. 1: 184, 1833, in part; Wats. King's Exp. 5: 85; Torr. Wilkes' Exp. 290 (in part); Wats. Bot. Cal. 1: 177 (in part); Greene, Fl. Fran. 1: 70.

Fragaria Virginiana var. *Illinoensis* Holz. Cont. U. S. Nat. Herb. 3: 222. In part. 1895.

Fragaria bracteata Heller, Bull. Torr. Club, 25: 194. 1896.

Fragaria Californica Howell, Fl. N. W. Am. 1: 174. In part. 1898.

ILLUSTRATION: Bull. Torr. Bot. Club, *pl.* 339.

Rootstock very short and rather thick. Leaves very thin, somewhat glaucous, silky when young, glabrate in age, especially on the upper surface; petioles slender, 3–10 cm. long, silky with long white spreading or reflexed hairs; leaflets broadly rhombic-obovate, coarsely toothed, 2–5 cm. long, the lateral ones very oblique. Runners very slender, rather few. Scape often over 1 dm. high, often exceeding the leaves, silky with long and spreading or reflexed hairs, often with a unifoliate leafy bract, 2–8-flowered. Flowers 1.5–2 cm. in diameter; sepals and bracts lanceolate, acute; petals rounded obovate, often nearly twice the length of the sepals. Fruit apparently somewhat elongated, ovoid or semi-ellipsoid, red, about .75 cm. in diameter and 1 cm. long; achenes superficial.

It is nearest related to *F. vesca* and *F. Americana*, differing from the former in the thinner leaves, the more slender habit and elongated fruit, and from the latter in the leafy bract, the larger flowers with spreading sepals, and the less sharply serrate and rounder leaflets. It represents *F. Americana* on the Pacific slope, but the ranges of the two overlap in the Rockies.

Idaho: A. A. & E. Gertrude Heller, No. 3279, 1896; A. D. E. Elmer, No. 341, 1896; Sandberg, MacDougal & Heller, No. 219, 1892; J. B. Leiberger, No. 1484, 1895; L. F. Henderson, No. 2687, 1894.

New Mexico: A. A. Heller, No. 3615, 1897.

British Columbia: John Macoun, 1889.

Vancouver Island: John Macoun, No. 163, 1893.

Montana: Mrs. C. H. Moore, 1893; J. H. Flodman, No. 592.

Washington: W. N. Suksdorf, No. 485, 1883; No. 2494, 1896.

Oregon: Elihu Hall, No. 137, 1871.

?*California*: Kellogg & Harford, No. 213, 1868–9; Michener & Bioletti, 1892.

Utah : S. Watson (King's Exp.), No. 321, 1869; M. E. Jones, No. 5347, 1894.

Wyoming : (Teton Range), Dr. Coulter, 1872.

Colorado : J. Ball, 1884.

8. *Fragaria Americana* (Porter) Britton.

Fragaria vesca Pursh, Fl. Am. Sept. 357 (mainly) 1814. Not L.¹

Nutt. Gen. 1 : 311; Eat. Man. Ed. 2, 249; Ed. 3, 282; Beck, Bot. Ed. 2, 98 (in part); Torr. Fl. N. Y. 1 : 212; Gray, Man. 124; Ed. 2, 120; Ed. 5, 156 (in part); Wood, Class Book 1855 : 253; 1863 : 341; Torr. Pac. R. R. Rep. 4 : 85 (in part, N. Mex. spec.); Coult. Man. Rocky Mts. 83; Porter & Coult. Fl. Colo. 35; Wats. & Coult. in Gray Man. Ed. 6 : 158; Coult. U. S. Geol. Surv. 1872 : 765.

Hook. Fl. Bor. Am. 1 : 184, 1833 (in part); Prov. Fl. Can. 1 : 186 (in part). Macoun, Cat. Can. Pl. 1 : 135.

Fragaria Canadensis Eat. Man. Ed. 7, 306. In part. 1836. Not Michx. 1803. Eat. & Wright, N. Am. Bot. 246.

Fragaria vesca β Torr. & Gray, Fl. N. A. 1 : 448. 1840.

Fragaria vesca var. *Americana* Porter, Bull. Torr. Bot. Club, 17 : 15. 1890.

Bailey in Gray, F. F. & G. Bot. Rev. Ed. 152; Rydb. Fl. Neb. 21 : 18; Cont. U. S. Nat. Herb. 3 : 157.

Fragaria Americana Britton, Bull. Torr. Bot. Club, 19 : 222. 1892.

ILLUSTRATION : Britton & Brown, Ill. Fl. 2 : *f.* 1911.

Rootstock short but not thick. Leaves very thin, very soon glabrate on both sides; petioles slender, 5–10 cm. long, sparingly silky, with less spreading hairs than in the related species, or glabrate; leaflets 3–8 cm. long, rhombic-obovate, mostly acute, sharply and deeply serrate, the lateral ones oblique at the base. Runners very slender and long. Scape slender, seldom over 1.5 dm. long, sparingly silky with slightly spreading or sometimes divaricate hairs, seldom much exceeding the leaves, very rarely leafy-bracteate. Fruit elongated-ovoid, .5–.75 cm. in diameter and 1–1.5 cm. long, red; achenes superficial.

It is, next to *F. Virginiana*, our most common strawberry, extending from Newfoundland and Virginia to New Mexico. It has been confounded with *F. vesca*, but differs in the thinner and sharper-toothed leaves, elongated fruit, slender habit, and finer, scantier and more appressed pubescence.

9. *Fragaria sibbaldifolia*.

Fragaria vesca Coville, Cont. U. S. Nat. Herb. 4 : 95. 1893. Not L.

¹Most of these references may also include the true *F. vesca*.

Rootstock short and thick, nearly erect. Leaves thin, glabrate above, silky beneath; stipules ovate, scarious; petioles 2–5 cm. long, slightly silky with spreading hairs; terminal leaflet broadly obovate, truncate, coarsely 3–7-toothed at the apex, 1–2 cm. long; lateral ones somewhat smaller, oblique at the base. Runners long and slender, rather numerous. Scape short, few-flowered, with rather scanty spreading silky hairs. Sepals and bractlets broadly lanceolate, acute, otherwise resembling those of the following. Fruit unknown.

It is evidently nearly related to the next species, differing mainly in the acute sepals, the few-toothed leaves and larger terminal leaflet. The smaller leaves, especially those of the plantlets formed by the runners, much resemble those of *Sibbaldia procumbens* L.

California: Near Mt. Whitney along branches of Kern River, Coville & Funston, No. 1712 (Death Valley Exp.) 1891.

10. *Fragaria truncata*.

Rootstock short and thick. Leaves rather few, thin, silky on both sides, but in age glabrate above; stipules oblong or ovate, brown, scarious; petioles slender, 2–8 cm. long, sparingly silky with long spreading hairs; leaflets petiolate, rounded-obovate, round-crenate above the middle, with the middle tooth smaller, 1.5–4 cm. long, the lateral ones very little oblique. Scape slender, few-flowered, seldom exceeding 1 dm. in height, and rarely leafy-bracteate, sparingly silky with spreading hairs. Flowers 1–2 cm. in diameter. Hypanthium, bractlets and sepals sparingly and finely silky; bractlets and sepals oblong or ovate, obtuse or acutish. Petals obovate, exceeding the sepals by about a third. Fruit unknown.

As the fruit is unknown to the author the place of this species is uncertain. If the achenes are in pits, *i. e.*, the species belongs to the present group, its place is next to *F. platypetala*, from which it is easily distinguished by its broad sepals and bractlets, its few-flowered scape, narrower petals and sparser and shorter pubescence. It also seems to have some relationship to *F. Chilensis* and *F. Californica*, the form of the leaves resembling most that of the former, while the texture is that of the latter, as is also the pubescence, although sparser.

California: Michener & Bioletti (Nevada Co.), 1893; Thomas Bridges, No. 103; Mrs. Austin, 1878; T. S. Brandegee.

11. *Fragaria platypetala*.

?*Fragaria Virginiana* var. *glauca* Rothr. Wheeler's Rep. 112. 1878.

Fragaria Virginiana var. *Illinoensis* Wats. Bot. Cal. 1: 177. 1876.

Coult. Man. Rocky Mts. 83; Porter & Coult. Fl. Col. 35; Holz. Cont. U. S. Nat. Herb. 3: 222 (in part).

Fragaria Californica Howell, Fl. N. W. Am. 1: 174. In part. 1898.

Rootstock very thick and woody, generally bearing several flowering stems. Leaves moderately thick, glabrous and glaucous above and appressed-silky beneath; petioles 2–20 cm. long, silky-villous with long spreading or reflexed hairs, moderately stout or rather slender; leaflets broadly cuneate or obovate, 2–8 cm. long, coarsely serrate or crenate above the middle, nearly always evidently petiolate, the lateral ones only a little oblique. Runners comparatively stout, long. Scape comparatively stout, but much less so than in *F. Virginiana*, generally about 1 dm., seldom 2 cm. high, sometimes only a few centimeters, rarely exceeding the leaves, rather many-flowered, often leafy-bracteate, silky-villous with long spreading or reflexed hairs. Flowers large, 1.5–2.5 cm. in diameter; sepals and bractlets lanceolate; petals almost orbicular, usually twice as long as the sepals. Fruit hemispheric, 1–1.5 cm. in diameter; achenes set in rather shallow pits.

It is nearest related to *F. Virginiana* and *F. glauca*; it differs from both by the large petals, from the former by more or less glaucous and rather smaller leaves, and from the latter by the spreading hairs of the petioles and scape and by the much less oblique lateral leaflets. Its range extends from Alaska and British Columbia to northern California and Colorado.

Alaska: J. O. Kaine, 1871.

British Columbia: John Macoun, 1890.

Washington: Sandberg & Leiberger, No. 86, 1893.

Oregon: Coville & Leiberger, No. 292, 1896; J. B. Lieberg, No. 682, 1894.

California: Mrs. R. M. Austin, 1894; W. C. Blasdale, 1895.

Idaho: B. W. Evermann, Nos. 542 and 576, 1896; Sandberg, MacDougal & Heller, Nos. 223, 106, 1892; L. F. Henderson, No. 2685, 1894; Lake & Hull, No. 498, 1892; G. B. Aiton, 1892; A. D. E. Elmer, No. 341, 1894.

Wyoming: E. Stevenson, No. 123, 1894.

Colorado: (?) John Wolf (Wheeler Exp.), No. 402, 1873.

Montana: Mrs. Moore, 1894.

12. *Fragaria Virginiana* Duch.

Fragaria Virginiana Duchesne, Hist. Nat. Fraiss. 204. 1766.

Mill. Gard. Diet. No. 2; Lam. Enc. Meth. 2: 539; Willd. Sp. Pl. 2: 1091; Ehrh. Beitr. 7: 24; Persoon, Syn. Pl. 2: 53; Ait. Hort. Kew. Ed. 2, 3: 272; Spreng. Syst. 2: 533; Seringe in DC. Prod. 2: 570; Don, Gard. Diet. 2: 543; Hook. Comp. Bot. Mag. 1:

35; Spach, Hist. Veg. 1: 466; Vilmorin, Jard. Fruit. Mus. Frag. 3, *pl.**; J. Gay, Ann. Sci. Nat. (IV.) 8: 201; Decaisne, Jard. Fruit. Mus. Frag. 42, *pl.**; Dietr. Syn. Pl. 3: 177.

Pursh, Fl. Am. Sept. 357; Bigelow, Florula Bost. 123; Ed. 2, 202; Ed. 3, 215; Nutt. Gen. 1: 311; Elliott, Sk. Bot. S. C. & Ga. 575; Eat. Man. Ed. 2, 249; Ed. 3, 282; Ed. 5, 220; Ed. 6, 148; Ed. 7, 305; Darl. Fl. Cest. 304; Torr. Fl. U. S. 500; Beck, Bot. 105; Ed. 2, 98, Torr. & Gray, Fl. N. A. 1: 447; Torr. Fl. N. Y. 1: 211; Gray, Man. 123; Ed. 2, 119; Ed. 5, 155; Wood, Class Book, 1855, 253; 1863, 341; Torr. Nicol. Rep. 149*; Parry, Pl. Minn. 612*; Chapman, Fl. 124; Coult. Man. Rocky Mts. 82; Wats. & Coult. in Gray, Man. Ed. 6, 158; Bailey in Gray, F. F. & G. Bot. Rev. Ed. 153; Britt. & Brown, Ill. Fl. 2: 206.

Macoun, Cat. Can. Pl. 1: 135; Hook. Fl. Bor. Am. 1: 184.

Fragaria Canadensis Michx. Fl. Bor. Am. 1: 299. 1803. In part.

Spreng. Syst. 2: 533; Seringe in DC. Prod. 2: 571; Don, Gard. Dict. 2: 546.

Pursh, Fl. Am. Sept. 357; Nutt. Gen. 1: 311; Elliott, Sk. Bot. S. C. and Ga. 575; Eat. Man. Ed. 2, 249; Ed. 3, 282; Ed. 5, 220; Ed. 6, 148; Beck, Bot. 105.

Hook. Fl. Bor. Am. 1: 185; Prov. Fl. Can. 1: 186.

Fragaria vesca Walt. Fl. Car. 150. 1788. Not L. 1753.

ILLUSTRATIONS: Britt. & Brown, Ill. Fl. 2: *f.* 1908; Hayne 4: *pl.* 28*; Decaisne, Jard. Fruit. *pl.* 2*.

Rootstock thick and short. Leaves moderately thick, or in shaded places rather thin, dark green, not glaucous, slightly silky when young, glabrate in age; petioles 2–30 cm. long, villous with spreading hairs, rather stout; leaflets 3–10 cm. long, obovate or oblong, always petiolate, coarsely toothed, obtuse at the apex. Runners long and rather stout. Scape stout, more or less villous with spreading or, on the pedicels, often appressed hairs, generally 1.5–2 dm. high, but often 4–5 dm. high, often with a foliaceous bract, and rather many-flowered. Flowers 1–2 cm. in diameter; bractlets and sepals lanceolate, acute or acuminate; petals obovate, generally exceeding the sepals by a half. Fruit 1–1.5 cm. in diameter, hemispheric; achenes set in pits.

F. Virginiana is the tallest and stoutest of our native strawberries. It is often cultivated and has produced several garden varieties.

In dryer soil, especially in Kansas, Nebraska and Minnesota, it is often only .5 dm. high, with smaller and more crowded leaves. A form from the southern states differs somewhat and may be treated as a variety. So, also, one from the prairie states. *F. Virginiana* has a range extending from Prince Edward Island to Minnesota, Indian Territory and Georgia.

Fragaria Virginiana australis.

Much smaller, 3–8 cm. high, more hairy; leaflets only 2–4 cm. long, almost sessile; sepals broader and more acuminate.

In the southern states, especially in the mountains.

Virginia: Mrs. E. G. Britton and Anna M. Vail, 1892; N. L. Britton, 1892.

North Carolina: J. K. Small, 1896; M. E. Hyams.

Louisiana: Dr. J. Hale.

Fragaria Virginiana Grayana (Vilmorin).

Fragaria Grayana Vilmorin; J. Gay, Ann. Sc. Nat. (IV.) 8: 202. 1857.

Decaisne, 47, *pl.**

Fragaria Virginiana var. *Illinoensis* Gray, Man. Ed. 5, 155. 1867.

Wats. & Coult. in Gray, Man. Ed. 6, 158; Bailey in Gray, F. F. & G. Bot. Rev. Ed. 153; Rydb. Fl. Neb. 21: 18.

Plant rather coarse and hairy; hairs of the pedicels spreading.

The extreme form looks very unlike the typical *F. Virginiana*, but so many intermediate grades are found, that it scarcely deserves varietal rank. It is rather common in the Prairie States from Ohio to Kansas.

13. Fragaria Canadensis Michx.

Fragaria Canadensis Michx. Fl. Bor. Am. 1: 299. 1803.

Richards. Frankl. Journ. 111 (in part); Britton, Bull. Torr. Club, 19: 222 (in part); Britt. & Brown, Ill. Fl. 2: 206. 1897.

Fragaria Virginiana Eat. Man. Ed. 6, 148. In part. 1833.

Eat. Man. Ed. 7, 305; Eat. & Wright, N. Am. Bot. 246.

? *Fragaria scrotina* Raf. Atl. Journ. 152.

ILLUSTRATIONS: Britt. & Brown, Ill. Fl. 2: *f.* 1909.

Rootstock short, but not very thick. Leaves thin but rather firm, often turning reddish, glabrate above, silky beneath, pedicels 3–10 cm. long, slender, silky with spreading hairs, in age often glabrate; leaflets oblong-obovate or cuneate, sharply serrate, 2–4 cm. long. Runners very long and rather slender. Scape rather shorter than the leaves, 4–10 cm. high, with spreading hairs, but very soon glabrate, 2–4-flowered. Flowers 1–1.5 cm. in diameter; sepals lanceolate, long-acuminate; petals broadly obovate, exceeding the sepals by about a half. Fruit oblong-conic 6–7 mm. in diameter and 1–1.25 cm. long; achenes set in pits.

It is a rather rare plant of northern distribution, and has been confused with *F. Virginiana* and *F. Americana*. In habit it most resembles the southern variety of the former, but differs by its longer sepals, elongated fruit and more slender and fewer-flowered scape. Michaux's description probably includes both this species, *F. Virginiana* and *F. Terrae-novae*. The specimens in his herbarium are in flower only, but they indicate a small-sized plant and must belong to either *F. Terrae-novae* or to the species for which the name is used here. In this respect the author has followed Dr. N. L. Britton, who was the first to point out the differences between this species and *F. Virginiana*.

New York: N. L. Britton, 1894; Anna M. Vail, 1891

Maine: (Mt. Desert), E. L. Rand, 1892.

Canada: John I. Northrop, No. 225, 1887; Richardson.

Newfoundland: Rev. A. C. Waghorne, No. 7, 1893.

Nova Scotia: (?) Dr. J. Dwight, 1894.

Michigan: A. A. Crozier, 1886.

14. *Fragaria prolifica* Baker & Rydb.

Rootstock short and very thick, crowned by numerous leaves and several short scapes. Leaves rather thin and dark green, glabrous above, sparingly silky or glabrate and strongly veined beneath, 3–7 cm. long; petioles 5–10 cm. long, appressed silky-strigose; leaflets obovate, coarsely toothed, often somewhat petiolate; the lateral ones oblique. Runners very numerous and rather stout. Scapes many-flowered, appressed-strigose, seldom over 1 dm. high. Flowers about 1 cm. in diameter; sepals and bractlets ovate-lanceolate; petals obovate, a little exceeding the sepals. Fruit hemispheric, 1–1.5 cm. in diameter; achenes set in pits.

It is nearest related to *F. Virginiana*, but differs in the smaller flowers, shorter and broader sepals, low scapes, strongly veined leaves and nearly appressed pubescence of the scapes and petioles. It is apparently confined to Colorado.

Mr. Baker collected the type specimens in the rich region in the neighborhood of Mt. Richtophen.

Colorado: C. F. Baker, No. 28, 1896 (8200–10000 ft., altitude); J. Ball, 1884 (7–9000 ft.); Geo. Engelmann, 1874.

15. *Fragaria pumila*.

Fragaria Virginiana Rydb. Cont. U. S. Nat. Herb. 3: 496. 1896.

Rootstock very short and thick. Leaves rather small and thick, dark green and silky above when young, soon glabrate, silky-strigose and finely puberulent beneath; petioles 2–4 cm. long, densely appressed silky-strigose, at least when young; leaflets ob-

long or narrowly obovate, 1-3 cm. long, crenate, the lateral ones only slightly oblique. Runners few and short. Scape few-flowered, generally about .5 cm. long, silky-strigose, seldom leafy-bracteate. Flowers 1-1.5 cm. in diameter; bractlets and sepals lanceolate; petals obovate, exceeding the sepals by about a half.

It is nearest related to the preceding, from which it differs in the smaller size, in the thicker leaves, which are puberulent as well as silky beneath, and by the few and short runners. In habit it resembles somewhat *F. Mexicana*, but differs in the pubescence and the pitted fruit. It seems to be a rather rare plant of limited range. The following specimens have been examined.

South Dakota: (Black Hills) Rydberg, No. 661, 1892 (type).

Wyoming: (Jackson's Hole) Dr. F. V. Hayden, 1860.

Colorado: (Pike's Peak) F. H. Knowlton, No. 5, 1896.

16. *Fragaria Terrae-novae*.

?*Fragaria Virginiana* Hook. Fl. Bor. Am. 1: 185. 1833.

Rootstock short but not very thick. Leaves rather thin, glabrate above, slightly silky beneath; petioles rather slender, 3-15 cm. long, appressed-silky when young, generally nearly glabrous in age, very rarely with somewhat spreading pubescence; leaflets 2-5 cm. long, obovate, serrate, the lateral ones slightly oblique at the base, all subsessile. Runners few and slender. Scape slender, at first silky-strigose, glabrate in age, few-flowered, generally without a foliaceous bract. Flowers 1.5-2 cm. in diameter; sepals and bracts lanceolate, acuminate; petals broadly obovate, often nearly twice the sepals. Fruit hemispheric, about 1 cm. in diameter; achenes set in pits.

This has been included in *F. Virginiana*, but is easily distinguished from that species by its smaller size, appressed pubescence of the petioles and scapes, the few-flowered scape, the nearly glabrous leaves and subsessile leaflets; it more resembles *F. Canadensis*, *F. pauciflora* and *F. Americana*. From the first it differs by the appressed pubescence on petioles and scapes and by the hemispherical fruit; from the second in the broader leaflets and the non glaucous hue; and from the last by the more rounded leaflets and the fruit bearing the achenes in pits. It also generally has larger flowers than any of the three species. The species is of northern and quite limited distribution.

Newfoundland: A. C. Waghorne, No. 14, 1893; No. 17, 1895; No. 15, 1896.

Prince Edward Island: John Macoun, 1888.

Ontario: J. Fowler, 1895.

Labrador: A. C. Waghorne, 1893.

Maine: E. E. Gayle, No. 717, 1895.

17. *Fragaria glauca* (Wats.).

Fragaria Virginiana (?) var. *glauca* Wats. Bot. King's Exp. 5 : 85. 1871.

Coult. Man. Rocky Mts. 83.

Fragaria vesca var. *Americana* Rydb. Cont. U. S. Nat. Herb. 3 : 496. 1896.

Rootstock rather short, but not very thick. Leaves thin, glaucous and almost glabrous above, silky or at last glabrate beneath; petioles slender, 5–15 cm. long, sparingly and appressed silky, or glabrate in age; leaflets broadly obovate, 3–5 cm. long, evidently petiolate, coarsely toothed, the lateral ones very oblique at the base. Runners long and slender, almost glabrous. Scape slender, rarely exceeding the leaves and seldom with a foliaceous bract, appressed-silky or glabrate, few-flowered. Flowers 1.5–2 cm. in diameter; sepals and bractlets oblong-lanceolate, acute; petals obovate, exceeding the sepals by about a half. Fruit hemispheric, 1–1.25 cm. in diameter; achenes set in rather shallow pits.

It much resembles *F. platypetala*, and perhaps the two might be regarded as forms of the same species; but as in *F. glauca* the thinner and broader leaflets, the lateral ones more oblique, are always accompanied by smaller flowers with narrower petals, a more or less appressed pubescence on the scape and petioles, and a more scanty one on the leaves, I think they are better kept distinct. Its range extends from the Mackenzie River to Colorado and westward to Nevada.

Utah: Watson (King's Exp.), No. 322, 1869.

Nevada: Wheeler, 1872.

Idaho: L. F. Henderson, No. 3596, 1895; J. M. Coulter, 1872.

Montana: J. N. Rose, No. 84 (at least in part), 1893; F. W. Anderson, 1888.

Northwest Territory: (Fort Simpson) I. S. Onion, 1861–2.

South Dakota: (Black Hills) Rydberg, No. 662, 1892.

Colorado: C. S. Sheldon, 1884; Dr. E. Penard, No. 155, 1891; George Smith, 1871; Mr. and Mrs. G. H. Hicks, No. 366, 1890; C. F. Baker, No. 27, 1896.

18. *Fragaria pauciflora*.

Fragaria Canadensis Richards. Frankl. Journ. App. 20. In part. 1823.

Britton, Bull. Torr. Bot. Club, 19 : 222. In part.

Fragaria vesca form. Rydb. Cont. U. S. Nat. Herb. 3 : 496. 1896.

Rootstock rather slender. Leaves thin and glaucous, almost glabrous above, and soon glabrate beneath; petioles and scape slender, sparingly appressed-silky or nearly glabrous, slender, 5–15 cm. long; leaflets cuneate, subsessile, coarsely toothed above the middle, the lateral ones scarcely at all oblique at the base. Runners rather few and

slender. Scape 2-4-flowered, seldom exceeding the leaves. Flowers 1-1.5 cm. in diameter; bractlets and sepals lanceolate; petals obovate. Fruit hemispheric, about 1 cm. in diameter; achenes set in very deep pits.

It differs from the preceding in the narrow leaflets, which are scarcely at all oblique, the slender rootstock, the more delicate habit and the deeply pitted fruit.¹ It has nearly the same range as *F. glauca*.

Montana: J. H. Flodman, Nos. 591 (type), 590, 594 and 595. 1896.

Wyoming: F. V. Hayden, 1859-60; F. Tweedy, No. 55, 1895.

Colorado: Dr. E. Penard, No. 156, 1891; J. Ball; Trelease, 1886; C. F. Baker, No. 26, 1896.

Utah: Mrs. Thompson, 1872.

Arizona: F. H. Knowlton, No. 105, 1889.

South Dakota: (Black Hills) Rydberg, No. 663, 1892.

Northwest Territory: (Elk River) Kennicott; Dr. Richardson, No. 186 (in part).

Alberta: John Macoun, 1885.

19. *Fragaria firma*.

Fragaria Virginiana Gray, Pl. Fendl. 42. 1849. Not Duch.

? *Fragaria vesca* var. *Americana* Aven Nelson, Wyo. Exp. Sta. Bull. 28: 102. 1896.

Rootstock short and thick. Leaves rather thick and firm, somewhat glaucous, glabrate above, rather densely silky beneath; petioles rather stout, 1-4 cm. long, densely silky-strigose; leaflets subsessile or short-petiolate, oblong or cuneate, 2-3 cm. long, toothed above the middle, the lateral ones scarcely at all oblique at the base. Scape short, densely silky-strigose, not much over .5 dm. high. Runners rather numerous, long and stout. Flowers 1-1.5 cm. in diameter; bractlets and sepals lanceolate; petals obovate, exceeding the sepals by a half. Fruit hemispheric, about 1 cm. in diameter; achenes set in pits.

This is evidently closely related to the two preceding, but differs in the texture of the leaves and the hairiness of the scape and petioles. The leaves have about the same form and texture as in *F. cuneifolia*, from which the plant differs mainly in the fruit. It also resembles *F. pumila*, but differs in the glaucous hue.

Arizona: G. C. Neally, No. 260, 1891; E. A. Mearns, No. 71, 1887; Edw. Palmer, 1869; No. 487, 1890; J. W. Toumey, No. 96, 1892; E. O. Wooton, No. 91, 1892.

Utah: M. E. Jones, No. 5389, 1894.

¹ That was the case at least with the type specimens which were seen by me in fresh state.

New Mexico: Fendler, No. 206, 1847.

Colorado: (?) C. S. Crandall, 1892; J. M. Coulter, 1873.

Wyoming: (?) Aven Nelson, No. 207.

20. *Fragaria Helleri* Holz.

Fragaria sp. Holz. Cont. U. S. Nat. Herb. **3**: 222. 1895.

Fragaria Helleri Holz. Bot. Gaz. **21**: 36. 1896.

Rootstock rather slender. Leaves very thin, glabrate above, finely silky beneath; petioles, as well as scapes, very slender, sparingly silky-strigose, or glabrate in age, 5–10 cm. long; leaflets rounded-obovate, coarsely serrate, the lateral ones very oblique. Runners very slender. Scape 1.5–2 dm. high, very slender, often with a foliaceous unifoliate bract. Flowers rather large, 1.5–2 cm. in diameter, on nodding pedicels; bractlets lanceolate, shorter than the ovate sepals, both acute; petals nearly orbicular, light rose-color, almost twice as long as the sepals. Mature fruit unknown, but achenes in the unripe ones superficial.

It is evidently nearest related to *F. bracteata*, from which it is easily distinguished by the nodding rose-colored flowers.

Idaho: Sandberg, MacDougal & Heller, No. 508, 1892.

9. *SIBBALDIA* L.

Sibbaldia L. Sp. Pl. 284. 1753.

Potentilla Clairv. Man. 166. 1811.

Dactylophyllum Spenn. Fl. Frib. **3**: 1034. In part. 1829.

Coelas Dulac. Fl. Hautes Pyr. 303. 1867.

Hypanthium saucer-shaped or cup-shaped, small. Bractlets, sepals and petals 5. Petals yellow, obovate, cuneate or oblanceolate, scarcely equalling the sepals. Stamens 5, inserted not very close to the small receptacle; filaments filiform but short, inclined. Pistils 5–20; style lateral. Ovule and seed attached near the base of the style, ascending and amphitropous.

Sibbaldia is a genus consisting of small arctic or alpine plants generally with ternate leaves and small flowers in small cymes. All the species are Siberian except the following which is also found in Europe and North America.

1. *Sibbaldia procumbens* L.

Sibbaldia procumbens L. Sp. Pl. 284. 1753.

L. Sp. Pl. Ed. 2, 406; Mill. Gard. Diet. Ed. 8, No. 1; Ait. Hort. Kew. **1**: 398; Ed.

2, 2: 199; Willd. Sp. Pl. 1: 1567; Lam. Fl. Franç. 3: 643; Enc. Meth. 7: 152; Pers. Syn. Pl. 1: 340; Spreng. Syst. Veg. 1: 956; DC. Prod. 2: 587; Roem. & Schult. Syst. 6: 768; Dietr. Syn. Pl. 2: 1019; Don, Gard. Diet. 2: 562.

Pursh, Fl. Am. Sept. 211; Nutt. Gen. 1: 207; Eat. Man. Ed. 5; 391; Ed. 6, 337; Ed. 7, 525; Torr. Fl. U. S. 330; Comp. 142; Frem. Rep. 89; Beck, Bot. 108; Torr. & Gr. Fl. N. Am. 1: 433; Eat. & Wr. N. Am. Bot. 424; Oakes, Hovey's Mag. 13: 217; Wood, Class Book, 343; Gray, Am. Jour. Sci. (III.) 33: 411; Proc. Acad. Phil. 1863: 61; Man. Ed. 1, 119; Ed. 2, 115; Ed. 5, 153; Wats. Pl. Wheeler, 37; Porter, Hayd. Rep. 1870: 475; 1871: 481; Porter & Coult. Fl. Col. 35; Brew. & Wats. Bot. Cal. 1: 180; Rothrock, Wheeler Surv. 4: 114; Coult. Man. Rocky Mts. 86; Rattan, An. Key W. Coast. Bot. 52; Wats. & Coult. in Gray, Man. Ed. 6, 161; Britt. & Brown, Ill. Fl. 2: 217.

Cham. & Schecht. Linnaea, 2: 28; Hook. Fl. Bor. Am. 1: 196; C. A. Meyer in Rup. Beitr. Pfl. Russ. 6: 44; Aschers. Fl. Lab. in Regensb. Flora, 43: 370*; Hook. f. Arct. Pl. 289; Rothr. Fl. Alaska, 445; Provancher, Fl. Can. 1: 190; Macoun, Cat. Can. Pl. 1: 135; Lange, Consp. Fl. Groen. 11 and 236; Rosenvinge, *ibid.* 656; Holz. Cont. U. S. Nat. Herb. 3: 223; Ledeb. Fl. Ross. 2: 32.

Potentilla procumbens Clairv. Man. 166. 1811*. Not Sibth.

Benth. & Hook. Gen. Pl. 1: 621; Baillon, Hist. Pl. 1: 371.

Wood, Bot. & Flor. 107; Wats. Bot. King's Exp. 5: 89; Greene, Fl. Fran. 1: 62; Coville, Cont. U. S. Nat. Herb. 3: 339; 4: 96.

ILLUSTRATIONS: Fl. Dan. *pl.* 32; Lam. Ill. *pl.* 221, *f.* 1; Gaertn. Fruct. & Sem. *pl.* 73; Baillon, *f.* 423-427; Eng. Bot. 13: *pl.* 897; Sv. Bot. *pl.* 761; Braune, Fl. Salib. 3: *pl.* 3*; Schkur, Handb. *pl.* 88; Sturm. Fl. Deutschl. 5: *pl.* 17; Baxter, Brit. Bot. 6: *pl.* 470; Britt. & Brown, Ill. Fl. 2: *f.* 1938. PLATE 100, *f.* 1; dissection of flower, *f.* 2; pistil, *f.* 3; stamen, *f.* 4; fruiting hypanthium and calyx, *f.* 5.

Densely caespitose, or with numerous creeping scaly rootstocks. Flowering stems less than 1 dm. high, more or less hirsute-strigose, few-leaved. Stipules triangular-obovate to lanceolate. Basal leaves on slender petioles, ternate, sparingly appressed-pilose; leaflets 1-2 cm. long, broadly cuneate, 3-5-toothed at the apex; stem leaves similar but short-petioled. Flowers few in rather dense cymes. Hypanthium 3-4 mm. in diameter, somewhat pilose. Bractlets and sepals subequal, broadly oblong or ovate. Petals yellow, spatulate, shorter than the sepals.

Sibbaldia extends in America from Greenland to the White Mountains of New Hampshire, British Columbia and Alaska, and in the alpine regions southward to Colorado and California. Also a native of arctic and alpine Europe and Siberia.

10. **SIBBALDIOPSIS.**

Potentilla Soland. in Ait. Hort. Kew. **2**: 216. 1789.

Trichothalamus Spreng. Anl. **2**: 864. In part. 1818.

Hypanthium almost flat. Bractlets, sepals and petals 5. Petals white, obovate or elliptic, neither unguiculate nor emarginate. Stamens about 20 in three series as normally in *Potentilla*, their insertion not distant from the base of the receptacle; filaments long and filiform; anthers round, cordate at the base, opening by a longitudinal slit. Receptacle hemispheric, bearing numerous pistils; style slender, filiform, lateral; stigma truncate; achene turgid, villous; seed ascending and amphitropous.

A low undershrub with truly trifoliolate, subcoriaceous leaves, which much resemble those of *Sibbaldia*. Torrey and Gray included this in their subgenus *Comocarpa*, but it differs in so many respects from *P. fruticosa* that I think it is better to regard it as the type of a distinct genus.

1. **Sibbaldiopsis tridentata** (Soland.)

Potentilla tridentata Soland. in Ait. Hort. Kew. **2**: 216. 1789.

Vahl, Symb. **2**: 59; Poir. in Lam. Enc. Meth. **5**: 601; Persoon, Syn. Pl. **2**: 56; Willd. Sp. Pl. **2**: 1010; Ait. Hort. Kew. Ed. 2, **3**: 279; Nestler, Mon. Pot. 28 and 66; Lehm. Mon. Pot. 30 and 190; Sprengel, Syst. Veg. **2**: 541; Seringe in DC. Prod. **2**: 585; Don, Gard. Dict. **2**: 552; Dietr. Syn. Pl. **3**: 180; Walp. Rep. **2**: 35; Ann. **2**: 470; Lehm. Rev. Pot. 22.

Michx. Fl. Bor. Am. **1**: 302; Pursh, Fl. Am. Sept. 353; Nutt. Gen. N. Am. Pl. **1**: 310; Eat. Man. Ed. 2, 378; Ed. 3, 407; Ed. 5, 343; Ed. 6, 279; Ed. 7, 456; Bigelow, Fl. Bost. Ed. 2, 205; Pl. Bost. 218; Torr. Fl. U. S. 495; Comp. 209; Fl. N. Y. 207; Torr. & Gray, Fl. N. Am. **1**: 445; Eat. & Wr. N. Am. Bot. 372; Gray, Man. Ed. 1, 123; Ed. 2, 119; Ed. 5, 155; Beck, Bot. 106; Ed. 2, 98; Chapman, Fl. S. U. S. 124; Darby, Bot. So. States, 303; Wood, Class Book, 342; Am. Bot. & Fl. 107; Wats. Proc. Am. Acad. **8**: 562; Wats. & Coult. in Gray, Man. Ed. **6**: 160; Bailey, in Gray, F. F. and G. Bot. Rev. Ed. 152; Britt. & Brown, Ill. Fl. **2**: 215.

Richardson, in Frankl. 1st Journ. 740; Ed. 2, App. 21; Lehm. in Hook. Fl. Bor. Am. **1**: 195; Schlecht. Linnaea, **10**: 98; Provancher, Fl. Can. 188; Macoun, Cat. Can. Pl. 141; Durand, Journ. Acad. Phil. **1856**: 191; Lange, Consp. Fl. Groen. 10 and 236; Rosenvinge, *ibid.* 650; Nathorst, Öfver. Kong. Vet. Ak. Förh. **1884**: 31; Meehan, Proc. Acad. Phil. **1893**: 210.

?*Potentilla retusa* Retz. Fl. Scand. Prodr. 123. 1795.

Don, Gard. Dietr. **2**: 550.

ILLUSTRATIONS: Eng. Bot. **34**: *pl.* 2389; Fl. Dan. **9**: *pl.* 1875; Hort. Kew. **2**: *pl.* 9; Britt. & Brown, Ill. Fl. **2**: *f.* 1933. PLATE 100, *f.* 6; dissection of flower, *f.* 7; pistil, *f.* 8; stamen, *f.* 9; fruiting hypanthium and calyx, *f.* 10.

Caudex woody and creeping; annual branches herbaceous, 1–2 dm. high, sparingly appressed silky-strigose. Stipules lanceolate, foliaceous, entire, about 5 mm. long. Leaves ternate, subcoriaceous, green and shining above, pale beneath; leaflets obovate-cuneate, three-toothed at the truncate apex. Cyme open, on a slender peduncle. Flowers about 1 cm. in diameter. Hypanthium appressed-strigose, in fruit about 5 mm. in diameter. Bractlets oblong, acute, shorter than the ovate-lanceolate acute sepals. Petals white, obovate or elliptic, about a half longer than the sepals or more.

A native of northeastern America, ranging from Greenland to New Jersey and Manitoba and in the Alleghanies extending as far south as northern Georgia; also occurs in the mountains of Scotland.

II. DASIPHORA Raf.

Potentilla L. Sp. Pl. 495. In part. 1753.

Dasiphora Raf. Aut. Bot. 167. 1838.

Comocarpa Torr. & Gr. Fl. N. Am. **1**: 445. As subgenus under *Potentilla*. 1840.

Rydb. Mem. Dept. Bot. Col. Univ. **2**: 6. 1898.

Hypanthium saucer-shaped. Bractlets, sepals and petals 5. Petals in ours yellow, nearly orbicular, neither unguiculate nor emarginate. Stamens about 25, in 5 festoons on a pentagonal disk surrounding the receptacular column; filaments filiform; anthers oblong, flat, not didymous, dehiscent by a longitudinal slit along the margin. Receptacle hemispheric, with numerous pistils; style club-shaped, thick and glandular upward, inserted near or below the middle of the ovary; stigma large and evidently four-lobed; achene densely covered with long straight hairs. Seed ascending and amphitropous.

The genus comprises 8 or 9 shrubs with scarious sheathing stipules and pinnate leaves, the leaflets in ours with entire margins; they are all Asiatic, but the following species is also native of North America and parts of Europe.

I. *Dasiphora fruticosa* (L.).

Potentilla fruticosa L. Sp. Pl. 495. 1753.

L. Sp. Pl. Ed. 2, 709; Mill. Gard. Dict. Ed. 8, No. 3; Dietr. Pflanz. Ed. 2, 89; Ait. Hort. Kew. **2**: 212; Ed. 2, **3**: 273; Willd. Sp. Pl. **2**: 1094; Poir. in Lam. Enc. Meth. **5**: 584; Persoon, Syn. Pl. **2**: 53; Nestler, Mon. Pot. 23 and 30; Lehm. Mon.

Pot. 20 and 31; Sprengel, Syst. Veg. **2**: 533; Seringe in DC. Prod. **2**: 579; Don, Gard. Dict. **2**: 560; Dietr. Syn. Pl. **3**: 190; Walp. Rep. **2**: 35; Ann. **2**: 469; Lehm. Rev. Pot. 16.

Mich. Fl. Bor. Am. **1**: 304; Pursh, Fl. Am. Sept. 355; Nutt. Gen. N. Am. Pl. **1**: 310; Eat. Man. Ed. 2, 379; Ed. 3, 408; Ed. 5, 344; Ed. 6, 281; Ed. 7, 458; Torr. Fl. U. S. 497; Comp. 210; Torr. Ann. Lyc. N. Y. **2**: 197; Beck. Bot. 107; Ed. 2, 99; Torr. & Gray, Fl. N. Am. **1**: 445; Eat. & Wr. N. Am. Bot. 373; Torr. Fl. N. Y. 210; in Fremont's 1st Exp. 89 [174]; Gray, Man. Ed. 1, 123; Ed. 2, 119; Ed. 5, 155; Noll, Fl. Pa. 434; Gray, Proc. Acad. Phil. **1863**: 61; Wood, Class Book, 343; Bot. & Fl. 107; Wats. King's Rep. **5**: 89; Proc. Am. Acad. A. & S. **8**: 561; Porter & Coult. Syn. Fl. Col. 38; Brewer & Wats. Bot. Cal. **1**: 180; Rothrock in Wheeler's Rep. **4**: 114; Porter, U. S. Geol. Rep. **1870**: 475; **1871**: 482; Coulter, l. c., **1872**: 765; Coult. Man. Rocky Mts. 86; Rattan, Key. W. Coast. Bot. 51; Greene, Fl. Fran. **1**: 63; Rydb. Cont. U. S. Nat. Herb. **3**: 497; Wats. & Coult. in Gray, Man. Ed. 6, 160; Bailey, in Gray, F. F. & G. Bot. Rev. Ed. 152; Britt. & Brown, Ill. Fl. **2**: 215.

Richardson, in Frankl. 1st Journ. 739; Ed. 2; App. 20; Cham. & Schlecht. in Linnaea, **2**: 24; Steller in Pall. N. Nord Beitr. **2**: 300*; Sievers in Pall. l. c. **7**: 198 and 229*; Lehm. in Hook. Fl. Bor. Am. **1**: 186; Hook. & Arn. in Beechey's Voy. 123; Ledeb. Fl. Ross. **2**: 61; Seeman. Bot. Herald, 29 and 51; Provancher, Fl. Can. 189; Macoun, Cat. Can. Pl. 141; Lange, Consp. Fl. Groen. 5.

Fragaria fruticosa Crantz. Inst. **2**: 176.

Dasiphora riparia Raf. Aut. Bot. 167. 1838.

ILLUSTRATIONS: Nestl. Mon. *pl. 1*; Sv. Bot. *pl. 253**; Eng. Bot. **2**: *pl. 88*; Wats. Dendr. Britt. **1**: *pl. 70*; Nouveau Duhamel, **2**: *pl. 4**; ¹Guimpel, Fr. Holzg. *pl. 42**; Regel, Gart. Fl **9**: *pl. 278**; Britt. & Brown, Ill. Fl. **2**: *f. 1932*. PLATE 10, *f. 1*; dissection of flower, *f. 2*; stamens, *f. 3-4*; pistil, *f. 5*; fruiting hypanthium and calyx, *f. 6*.

Shrub .3 m. to 1.5 m. high; branches when young silky-hairy, in age with brownish shreddy bark. Stipules ovate to ovate-lanceolate, acuminate, scarious and veiny. Leaves pinnate, with 1-3 pairs of leaflets, generally 2 approximate pairs, silky above, silky and whitish beneath; leaflets oblong, 1-2 cm. long, generally acute and with more or less revolute margins. Flowers in small loose cymes or solitary, large, 1.5-3 cm. in diameter. Hypanthium silky-villous, in fruit about 1 cm. in diameter. Bractlets linear-oblong, generally slightly exceeding the broadly ovate acuminate sepals. Petals yellow, orbicular, often twice as long as the sepals.

It ranges in North America from Labrador and Alaska to New Jersey and Cali-

¹ Fide Pritzel, Icon. Bot. Ind.

ifornia and in the mountains to New Mexico and Arizona. It is also a native of Siberia, the mountains of England, France and Spain and the island Oeland in the Baltic Sea. The typical form grows mostly in rich soil along streams. A form with very large flowers, 3 cm. in diameter, is *P. fruticosa grandiflora* Lehmann, Mag. Ges. Nat. Fr. Berlin, **7**: 284 and Rev. Pot. 16; this has been collected in Colorado by C. F. Baker, in 1896; it does not deserve even varietal rank; the same may perhaps be said of the following.

***Dasiphora fruticosa tenuifolia* (Willd.).**

Potentilla tenuifolia Willd.; Schlecht. Mag. Ges. Naturf. Fr. Berlin, **7**: 284. 1813.

Potentilla floribunda Pursh, Fl. Am. Sept. 355. 1814.

Poir. Suppl. **4**: 540; Eat. Man. Ed. 2, 380; Ed. 3, 408; Bigel. Fl. Bost. Ed. 2, 203; Pl. Bost. 216; Don, Gard. Dict. **2**: 561.

Potentilla Laureironis Tratt. Ros. Mon. 4.

Potentilla fruticosa var. *tenuifolia* Lehm. Monog. 1820.

Lehm. Rev. Pot. 17; Walp. Ann. **2**: 470.

Potentilla fruticosa var. *tenuiloba* Turczon. Bull. Soc. Nat. Moscow, **16**: 615.

Ser. in DC. Prod. **2**: 279.

Dasiphora floribunda Raf. Aut. Bot. 167. 1838.

ILLUSTRATIONS: Amman, Ruth. *pl.* 18, *f.* 1.

Leaflets linear-oblong, with revolute margins, shrub lower and more hairy.

This is only the high mountain form of *D. fruticosa*, especially when growing among exposed rocks. It has the same distribution as the species and is perhaps more common. The extreme is reached by

***Dasiphora fruticosa monticola*.**

Potentilla fruticosa var. *parvifolia* Wats. Proc. Am. Acad. **7**: 561. 1873. Not *P. parvifolia* Fisch. (1831), which is also a *Dasiphora*.

Potentilla fruticosa var. *alpina* Wats. & Rothr. Cat. Pl. Wheeler Surv. **8**: 1874. Not *P. alpina* Dalla.

Rothr. Wheeler's Rep. **4**: 114.

ILLUSTRATIONS: PLATE 101, *f.* 7.

Leaflets very small, about .5 cm. long, linear; flowers small, about 1 cm. in diameter on comparatively long pedicels.

Nevada: Watson (King's Exp.), No. 342.

12. DRYMOCALLIS Fourr.

Potentilla L. Sp. Fl. 495. In part. 1753.

Argentina Lam. Fl. Franç. **3**: 118. In part. 1778.

Boottia Big. Fl. Bost. Ed. 2, 351. 1824. Not Necker.

Potentilla subg. *Closterostyles* Torr. & Gray, Fl. N. Am. 1: 445. 1840.

Drymocallis Fourr. Ann. Soc. Linn. Lyon (II.) 16: 371. 1868.

Hypanthium saucer-shaped or hemispheric. Bractlets, sepals and petals 5. Petals obovate, elliptic or nearly orbicular, neither unguiculate nor emarginate, yellow or white. Stamens 20–30 in 5 festoons on the much-thickened margin of a pentagonal disk around the receptacle; filaments filiform; anthers oblong, truncate at both ends or cordate at the base, flat and deliscent by a longitudinal marginal slit. Receptacle hemispheric or semiellipsoid with very numerous pistils. Style nearly basal, in all our species except two thickened and glandular a little below the middle and tapering to both ends, rather persistent; stigma minute. Seed attached near the base of the style, ascending and orthotropous.

The genus consists of about 18 or 20 more or less glandular or viscid, erect and generally rather tall herbs, with perennial rootstocks and pinnate leaves. *Potentilla rupestris* L. of Europe and northern Asia, *P. macrocalyx* of the Pyrenees and *P. geoides* of Siberia and perhaps a few others also belong here. The following are North American.

KEY TO THE SPECIES.

Style fusiform, less than twice as long as the achene.

Petals and sepals erect or spreading in anthesis.

Petals white, or in drying often yellowish.

Plants 3–10 dm. high; cyme contracted or narrow; petals scarcely exceeding the sepals.

Leaves densely pubescent; branches of the cyme short. 1. *D. arguta*.

Leaves more glabrate, branches of the cyme longer, erect. 2. *D. convallaria*.

Plant 2–5 dm. high; cyme open with slender spreading branches; petals exceeding the sepals by a third. 3. *D. pseudorupestris*.

Petals yellow; sepals lanceolate to ovate, acute.

Bractlets more than half as long as the sepals; plants evidently glandular or viscid.

Flowers 15–20 mm. in diameter; petals exceeding the sepals by about a third.

Plant tall, 3–10 dm. high; cyme open, flat-topped. 4. *D. glutinosa*.

Plant low, 2–3 dm. high; cyme narrow. 5. *D. fissa*.

Flowers 10–15 mm. in diameter; petals equalling or slightly exceeding the sepals.

6. *D. glandulosa*.

Bractlets less than half as long as the sepals; plants scarcely at all glandular or viscid.

Cyme with erect or merely spreading branches; inflorescence and hypanthium densely pilose.

Petals slightly exceeding the sepals. 7. *D. Hanseni*.

Petals exceeding the sepals by a third. 8. *D. Ashlandica*.

Cyme with divergent branches; whole plant sparingly hairy, or glabrate.

9. *D. glabrata*.

Petals ochroleucous; sepals broadly ovate, mucronate.

10. *D. Wrangeliana*.

Petals and sepals more or less reflexed in anthesis, the former yellow, not exceeding the latter.

11. *D. reflexa*.

Style filiform or nearly so, more than twice as long as the achene.

Plant about 2 dm. high; petals much longer than the sepals; leaflets rhombic-obovate.

12. *D. rhombifolia*.

Plant 4-6 dm. high; petals about equalling the sepals; leaflets cuneate-flabellate.

13. *D. cuneifolia*.

1. *Drymocallis arguta* (Pursh).

Potentilla arguta Pursh, Fl. Am. Sept. 736. 1814.

Poir. in Lam. Enc. Meth. Suppl. 4 : 538; Lindl. Bot. Reg. *pl.* 1379; Don, Gard. Dict. 2 : 558; Dietr. Syn. Pl. 3 : 186; Walp. Rep. 2 : 35; Ann. 2 : 477; Lehm. Rev. Pot. 50.

Eat. Man. Ed. 7 : 458; Beck, Bot. 107; Ed. 2, 100; Bigelow, Pl. Bost. 219; Torr. & Gray, Fl. N. Am. 1 : 445; Eat. & Wr. N. Am. Bot. 374; Torr. Fl. N. Y. 209; Frem. 1st Exp. 89 [174]; Gray, Man. Ed. 1, 122; Ed. 2, 119; Ed. 5, 154; Noll, Fl. Pa. 433; Pac. R. R. Rep. 12 : book 2, part 2 : 39; Wood, Class Book, 343; Bot. & Flor. 108; Porter, U. S. Geol. Surv. 1870 : 475; Wats. Proc. Am. Acad. 8 : 551; Porter & Coult. Syn. Fl. Colo. 35 (in part); Coult. U. S. Geol. Surv. 1872 : 765; Man. Rocky Mts. 83; Wats. & Coult. in Gray, Man. Ed. 6, 158; Bailey, in Gray, F. F. & G. Bot. Rev. Ed. 151; Rydb. Cont. U. S. Nat. Herb. 3 : 157 and 496; Fl. Neb. 21 : 17; Britt. & Brown Ill. Fl. 2 : 209.

Richardson in Frankl. 1st Journ. 739; Ed. 2 : App. 20; Lehm. in Hook. Fl. Bor. Am. 1 : 186; Provancher, Fl. Can. 189; Macoun, Cat. Can. Pl. 136 and 516.

Geum agrimonioides Pursh, Fl. Am. Sept. 351. 1814. Not *P. agrimonioides* Bieb. Sprengel, Syst. Veg. 2 : 543; Poir. in Lam. Enc. Suppl. 5 : 573; Seringe in DC. Prodr. 2 : 554.

Potentilla confertiflora Torr. Fl. U. S. 499. 1824.

Spreng. Syst. Veg. 4 : 198; Lehm. Stirp. Pug. 3 : 24; Torr. Comp. Fl. U. S. 211.

Boottia sylvestris Bigel. Fl. Bost. Ed. 2, 206. 1824.

Potentilla Pennsylvanica var. *arguta* Torr. Ann. Lyc. N. Y. 2 : 197, 127.

Potentilla obliqua Dougl. (as a syn.) in Hook. Fl. Bor. Am. 1 : 186. 1833.

Potentilla ferruginea Dougl. (as a syn.) l. c. Not Paxton.

Potentilla glutinosa Pursh (as a syn.) in Lehm. Rev. Pot. 50. 1856.

Potentilla arguta var. *ferruginea* Lehm. Rev. Pot. 50. 1856.

Potentilla Bigeloviana Wenderoth, Sem. Hort. Marb. 1841*.

Linnaea, 16: Litt. 112.

ILLUSTRATIONS: Hook. Fl. Bor. Am. **1**: *pl. 63*; Lindl. Bot. Reg. **16**: *pl. 1379*; Britt. & Brown, Ill. Fl. **2**: *f. 1913*. PLATE 102, *f. 1, 2*; dissection of flower, *f. 3*; pistil, *f. 4*; stamen, *f. 5*; fruiting hypanthium and calyx, *f. 6*.

Stem stout and erect, 3–10 dm. high, striate, generally densely glandular or viscid, hirsute with spreading hairs, generally simple below, branched above, with very short nearly upright branches. Lower stipules ovate-lanceolate, submembranous and sub-entire, the upper broadly ovate and coarsely dentate or entire. Basal leaves many, with petioles 5–20 cm. long, pinnate; leaflets 3–5 pairs, strongly veined, densely pubescent on both sides with appressed hairs, or those on the veins spreading. Upper three leaflets larger than the others, 2–10 cm. long, generally 4–5 cm., doubly serrate, the odd one generally rhomboid, the others usually obliquely ovate; the lower pairs gradually diminishing downward. Stem leaves similar but smaller, with short petioles and fewer leaflets. Flowers in a crowded dense, strict cyme, 12–18 mm. in diameter. Hypanthium glandular viscid, in fruit enlarged. Bractlets lanceolate, much smaller than the oblong-ovate acute or mucronate sepals. Petals broadly obovate or nearly orbicular, white or ochroleucous, in drying turning yellow, a little longer than the sepals. Stamens 25–30, most commonly 30; anthers flat, slightly cordate at the base. Pistils numerous; achenes smooth; style basal or nearly so, fusiform.

This is the only eastern species of the genus, extending from New Brunswick to the District of Columbia, westward to the foothills of the Rocky Mountains, from Colorado, as far north as Fort Simpson, on the Mackenzie River. It differs from the others by its pubescence, which is coarser, densely hirsute and glandular, and by its dense and strict cyme. Dr. Watson observes that in the Rocky Mountain region there is found a form of *P. arguta* with bright yellow flowers. This is probably a mistake, and the specimens referred to belong to *D. glutinosa*.

The variety *ferruginea* described by Lehmann I can but regard as a large form of the species. The plant very commonly takes on a brownish or ferruginous hue in age. The *Potentilla ferruginea* of Paxton's Magazine,¹ cited by Lehmann, has nothing to do with this species; it is a true *Potentilla*, a hybrid of the purple-flowered *P. atrosanguinea* with the yellow *P. pedata*.

2. *Drymocallis convallaria*.

Potentilla convallaria Rydberg, Bull. Torr. Bot. Club, **24**: 249. 1897.

ILLUSTRATIONS: Bull. Torr. Bot. Club, **24**: *pl. 306*. PLATE 104.

Stem tall, erect, 4–10 dm. high, long-villous but not very densely so, glandular or viscid, especially above, branched above with long erect branches. Stipules ovate or

¹ 5: 233. 1838.

lanceolate, more or less toothed, about 1 cm. long; basal leaves several, with villous petioles 5–10 cm. long, pinnate; leaflets 4 or 5 pairs, glabrate or slightly pubescent, 2–5 cm. long, broadly obovate and obtuse, coarsely serrate and incised with ovate teeth; stem leaves with fewer more acutish leaflets. Cyme with rather elongated upright branches, but with short pedicels, and therefore rather long and narrow. Flowers 10–18 mm. in diameter. Hypanthium densely glandular-viscid, villous, not much enlarged in fruit, 8–10 mm. in diameter. Petals broadly obovate, white, turning yellow in drying, a little longer than the sepals. Bractlets lanceolate, much smaller than the ovate-lanceolate sepals. Stamens about 25; anthers flat, slightly cordate at the base.

This species resembles *D. arguta*, but is more slender. The branches of the cyme are more elongated, hypanthium smaller, stamens fewer and the leaflets rounder and nearly glabrous. The leaves most resemble those of *D. glutinosa*, from which the plant differs mostly in its smaller and white petals and in the narrow cyme. It has been labelled *Potentilla arguta* whenever collected and is apparently a rather rare plant, representing that species in the valleys of the northern Rockies. The following specimens have been examined:

Montana: Rydberg; J. H. Flodman, No. 602, in the Elk Mountains; No. 603 in the Spanish Basin; No. 604 (type) near Bozeman; No. 605 in the Bridger Mountains, all in 1896; F. L. Scribner, No. 42, 1883.

Washington: Wilkes' Exp., No. 817; C. V. Piper, No. 1528.

Assiniboia: J. Macoun, No. 41, 1880. (?)

Idaho: A. A. & Gertrude Heller, No. 3230, 1896.

Wyoming: T. H. Burglehaus, 1894; E. Stevenson, No. 72, 1894; Nelson, No. 2151, 1896.

Alberta (?): Macoun, No. 623, 1885 (Kananaskis).

3. *Drymocallis pseudorupestris*.

? *Potentilla rupestris* Presl, Epim. Bot. 198. 1849. Not L.

Potentilla glandulosa var. *Nevadensis* Wats. Bot. Cal. 1: 178. In part. 1876. Not *P. Nevadensis* Boiss.

Potentilla pseudorupestris Rydberg, Bull. Torr. Bot. Club, 24: 250. 1897.

ILLUSTRATIONS: Bull. Torr. Bot. Club, 24: pl. 307. PLATE 103.

Stem erect, slender, striate, 2–5 dm. high, branched, with slender ascending branches, sparingly glandular-villous. Stipules ovate, more or less toothed. Basal leaves several with rather short petioles; leaflets 3 or 4 pairs, sparingly and finely pubescent or glabrate, the terminal one obovate, cuneate-flabelliform, the lateral ones obliquely elliptic

or nearly orbicular, all coarsely serrate and incised with ovate mucronulate teeth; stem leaves generally few; leaflets 2 pairs or ternate and more rhombic. Cyme open, with ascending branches and slender pedicels. Flowers 15–20 mm. in diameter. Hypanthium more or less glandular-viscid, villous, in fruit not much enlarged, 8–10 mm. in diameter. Petals white, drying yellowish, broadly obovate, exceeding the sepals by a third. Bractlets oblong or lanceolate, much shorter than the ovate-lanceolate pointed sepals. Stamens about 25; anthers flat, a little cordate at the base.

This species is exceedingly similar to the European *D. rupestris*, from which it differs only in the smoother leaves and the longer pubescence of the stem. It differs from the other white-flowered American species in the open cyme, the slender pedicels and the larger petals, which nearly equal in size those of *fissa* and *glutinosa*. It grows in the mountains at an altitude of 2000 to 3000 m. The form growing at lower elevations is more leafy, with larger and glabrate leaflets and less viscid stem; this I mistook for *P. lactea* Greene, but Professor Greene has assured me that it is not that species. In alpine regions it is more glandular viscid and with smaller leaflets. The following specimens have been examined:

Montana: Rydberg and J. H. Flodman, Long Baldy, Little Belt Mountains, No. 598 (type); Yogo Baldy, No. 499; Spanish Basin, Nos. 597 and 600; Little Belt Mountains, No. 601 (altitudes 6000–8000 feet); R. S. Williams, No. 754, 1888.

Idaho: B. W. Evermann, No. 363, 1895; J. H. Sandberg, No. 164, 1888; J. B. Leiberger, 1890.

California: W. H. Brewer, No. 1714, 1863; Kellogg & Harford, No. 211, 1868–9.

Washington: W. H. Suksdorf, 1885.

Yellowstone National Park: T. H. Burglehaus, 1893.

Rocky Mountains of British America: Dawson, Nos. 7471, 7870, 18734, 1430, 1881; J. Macoun, No. 10474, 1895.

POTENTILLA LACTEA Greene, Pittonia, 3: 20, 1896 (*P. glandulosa* var. *lactea* Greene, Fl. Fran. 65) is still unknown to me. It must be nearly related to the preceding species, but, according to Professor Greene himself, not identical with either of them. The original description drawn partly from fragmentary specimens and mostly from a painting reads as follows: “Delicately and not notably hirsutulous, scarcely glandular, 2 feet high, more loosely cymose branching than the last;¹ calyx-segments narrow and elongated, lanceolate, acuminate, surpassed by the broadly obovate very obtuse white petals; common at middle elevations in the Sierra Nevada, Cal.; also appearing to form a part of the Watsonian *P. glandulosa* var. *Nevadensis*.”

¹i. e., *P. Hansenii* Greene.

4. *Drymocallis glutinosa* (Nutt.).

Potentilla arguta Nutt. Journ. Acad. Phil. **7**: 21. 1834. Not Pursh, 1814.

Hook. Fl. Bor. Am. **1**: 186. In part.

Potentilla fissa var. *major* Torr. & Gray, Fl. N. Am. **1**: 446. 1840. Not *P. verna* var. *major* Wahl.

Walp. Rep. **2**: 35; Ann. **2**: 477.

Potentilla glutinosa Nutt.; Torr. & Gray, Fl. N. Am. **1**: 446. As synonym. 1840.

Potentilla glandulosa Holz. Cont. U. S. Dept. Agric. **3**: 222. 1892. (Mainly.)

Potentilla valida Greene, Pittonia, **3**: 20. 1896.

ILLUSTRATION: PLATE 105, *f. 1*; dissection of flower, *f. 2*; stamens, *f. 3, 4*; pistil, *f. 5*; fruiting hypanthium and calyx, *f. 6*.

Stem stout, tall, 4–10 dm. high, erect, striate, more or less pubescent with long, viscid or glandular, villous hairs, branched above. Stipules ovate, more or less toothed. Basal leaves pinnate; leaflets 3–5 pairs, more or less pubescent or glabrate, 3–6 cm. long, the terminal one broadly obovate, the lateral ones obliquely elliptic or nearly orbicular, all coarsely serrate and incised. Stem leaves similar but with fewer, more rhombic and acutish leaflets. Cyme open, with divergent branches, in fruit rather flat-topped. Flowers 18–22 mm. in diameter. Hypanthium viscid-villous; bractlets lanceolate, about a third shorter than the ovate-lanceolate pointed sepals. Petals yellow, broadly elliptic or nearly orbicular, exceeding the sepals by about a third. Stamens about 25; anthers flat, slightly cordate at base. Style fusiform.

It most resembles *D. arguta* in habit, is fully as stout and as pubescent, but the hairs are finer, the longer hairs villous rather than hirsute. The cyme is open in age, rather flat-topped, the pedicels longer, the sepals thinner and more acute, and the petals larger, generally much exceeding the calyx, and bright yellow.

In Utah, Montana and Wyoming the plant is lower, more glabrous and with smaller flowers and approaches in habit both *fissa* and *glandulosa*. The form of the west slope has larger flowers than any of the species, is very stout and quite hairy. *D. glutinosa* ranges from Vancouver Island and British Columbia to Wyoming and Utah. Specimens examined:

British Columbia: H. Wyeth (sources of the Oregon, type); John Macoun.

Washington: Suksdorf, 1884; No. 2211, 1893 (slender form); Mrs. Susan Tucker; C. V. Piper, No. 1528, 1893¹ (?); Kirk Whited, No. 110, 1896; No. 415, 1897.

Oregon: Dr. Lyall, 1861; Spalding; W. C. Cusick, No. 418, 1877.

¹ Smaller form.

Idaho: Sandberg, MacDougal & Heller, Nos. 47 and 175, 1892; Leiberg, No. 80, 1889¹(?); L. F. Anderson, No. 2866, 1894; Sandberg, 1892.

Utah: M. E. Jones, No. 1108, 1879.

Montana: Rydberg; Flodman, No. 596, 1896.¹

Wyoming: Aven Nelson, No. 1388, 1895;¹ No. 867, 1894;¹ No. 2639, 1896; F. H. Knowlton, 1887.

***Drymocallis glutinosa* Neo-Mexicana.**

Potentilla fissa var. *major* Gray, Mem. Am. Acad. 4: 41.

Fully as stout as the typical form, but the leaves more hairy, the petals scarcely exceeding the sepals.

This is a little known plant from New Mexico, resembling *arguta* in many respects, but the region in which it grows is far outside of the range of that species as well as of *glutinosa*. The first specimen mentioned below was included in *Potentilla fissa* var. *major* by Gray and Lehmann, but it is doubtful if it belongs there. Gray suggests that it may be a variety of *P. arguta*.

New Mexico: A. Fendler, No. 197, 1847; W. A. Bell, 1867; Newberry in McComb's Expedition.

5. *Drymocallis fissa* (Nutt.).

Potentilla fissa Nutt.; Torr. & Gray, Fl. N. Am. 1: 446. 1840.

Dietr. Syn. Pl. 3: 187; Walp. Rep. 2: 35; Ann. 2: 477; Lem. Rev. Pot. 49.

Hook. Journ. Bot. 6: 220; Gray, Am. Journ. Sc. (II.) 33: 411 (Repr. 22); Proc. Acad. Phil. 1863: 61; Porter, U. S. Geol. Surv. 1871: 482.

Potentilla arguta Porter & Coulter, Syn. Fl. Col. 36 (in part); Coulter, Man. Rocky Mts. 83 (in part); Aven Nelson, Wy. Exp. St. Bull. 28: 102; Coult. U. S. Geol. Surv. 1872: 765.

Potentilla glandulosa Wats. Proc. Am. Acad. 8: 552 (in part). 1873.

Coult. Man. Rocky Mts. 83 (in part).

Potentilla scopulorum Greene, Erythea, 1: 4. 1893.

ILLUSTRATION: PLATE 106, *f.* 1, 2; dissection of flower, *f.* 3; stamens, *f.* 4; pistil, *f.* 5; fruiting hypanthium and calyx, *f.* 6.

Stem low, 2-3 dm., or sometimes 4 dm. high, very leafy and branched, glandular-hirsute throughout. Stipules very wide, broadly ovate to subreniform, acute and generally deeply toothed. Basal leaves with short petioles, very veiny and slightly hairy on both sides, or subglabrous above, pinnate; leaflets, as a rule, 4 pairs, nearly orbicular, ex-

¹ Smaller form.

cept the upper ones, which are somewhat rhombic, all deeply incised and doubly serrate. Stem leaves similar, only the upper ones reduced. Flowers large, 15–20 mm. in diameter, in a narrow cyme, often in the axils of the leaves far down. Hypanthium densely glandular-viscid. Bractlets linear to ovate, the broader ones sometimes toothed, shorter than the triangular-lanceolate, long-acuminate sepals, which are often 1 cm. long in fruit. Petals orbicular, very concave, much exceeding the sepals.

The flowers much resemble those of the preceding, the petals being bright yellow, very large, orbicular, very concave, and much exceeding the ovate-lanceolate long-acuminate sepals, but the habit is very different; *D. fissa* is a low plant, seldom exceeding 2 dm. high, very bushy, with a narrow and few-flowered cyme; also often with some flowers in the axils of the leaves; the leaves most resemble those of the next, but the leaflets are generally more rounded and with stronger veins. The type specimens of *D. scopulorum* are less glandular than the original of *D. fissa*, but very glandular specimens have been collected even in Colorado. *D. fissa* occurs in the higher Rockies. It is common in Colorado, rare in Wyoming and Montana.

Colorado: Numerous collections.

Wyoming: T. C. Porter, 1871; Aven Nelson, Nos. 85 and 95, 1894; No. 1351, 1895; F. Tweedy, No. 74, 1893; B. C. Buffum, 1892.

Yellowstone National Park: G. W. Letterman, No. 136, 1885; C. H. Hall, 1888.

Montana: F. V. Hayden, No. 8, 1859; Mrs. Moore, 1874 (?); F. W. Traphagen, 1885.

?*Oregon*: Nuttall (type).

6. *Drymocallis glandulosa* (Lindl.).

Potentilla glandulosa Lindl. Bot. Reg. **19**: *pl.* 1583. 1833.

Dietr. Syn. Pl. **3**: 187; Walp. Rep. **2**: 35; Ann. **2**: 476; Lehm. Rev. Pot. 48.

Torr. & Gray, Fl. N. Am. **1**: 446; Newberry, Pac. R. R. Rep. **6**: No. 3, 72; Porter, U. S. Geol. Surv. **1871**: 482; Coulter, l. c., **1872**: 765; Wats. Proc. Am. Acad. **8**: 552 (mainly); Port. & Coult. Syn. Fl. Col. 36; Coulter, Man. Rocky Mts. 83 (mainly); Tweedy, Fl. Yell. Nat. Park, 55; Coville, Cont. U. S. Nat. Herb. **4**: 95 (in part); Rose, l. c. **3**: 570; Holz. l. c. **3**: 222; Rydberg, l. c. **3**: 496.

J. Macoun, Cat. Can. Pl. 136 and 516; J. M. Macoun, Can. Rec. Sci., 1895 (Rep. 4).

ILLUSTRATIONS: Lindl. Bot. Reg. **19**: *pl.* 1583. PLATE 107, *f.* 1; dissection of flower, *f.* 2; pistil, *f.* 3; fruiting hypanthium and calyx, *f.* 4.

Stem strict, 3–6 dm. high, more slender than in *D. arguta*, indistinctly striate, viscid and glandular-hairy, especially upward, subsimple below, irregularly branched above. Lower stipules lanceolate, the upper ovate, acuminate and generally deeply toothed.

Basal leaves with petioles 2–10 cm. long, pinnate, sometimes interruptedly so; leaflets 3 or 4 pairs, sparingly hairy, nearly glabrous on the upper surface; leaflets obovate, generally obtuse, simply or doubly serrate with broad teeth, the upper generally a little larger, 1–3 cm. long. Stem leaves smaller, short-petioled, 1–3 paired. Flowers in an open many-flowered cyme, 10–15 mm. in diameter. Hypanthium glandular-hirsute; bractlets linear-lanceolate, much shorter than the oblong or ovate-lanceolate, gradually acuminate, acute sepals, which in fruit are about 1 cm. long. Petals obovate, about equalling the sepals.

Resembles *D. glutinosa* in the open many-flowered cyme and general habit, but is a much more slender plant. It resembles *D. fissu* in the leaves, the long sepals and the shorter glandular pubescence, which is sometimes rather sparse. It differs from both by its petals, which are obovate, flat and about equal the sepals. Next to *D. arguta*, it is the most common and has the widest range of the genus. It extends from British Columbia and Alberta to the Black Hills of South Dakota and the foothills of New Mexico and California.

Suksdorf has collected a plant in West Klickitat Co., Wash., which agrees perfectly with *D. glandulosa*, except that the petals are very small, obovate-spatulate and white, and the sepals approach those of *D. Wrangelliana* in form.

***Drymocallis glandulosa incisa* (Lindl.).**

Potentilla glandulosa var. *incisa* Lindl. Bot. Reg. *pl.* 1973. 1837.

Torr. & Gray, Fl. N. Am. **1** : 446; Lehm. Rev. Pot. 48; Walp. Ann. **2** : 476.

ILLUSTRATION : Lindl. Bot. Reg. **23** : *pl.* 1973.

Leaves incised with very sharp teeth. Specimens examined :

Washington : W. H. Suksdorf, No. 2307, 1894.

Oregon : W. H. Suksdorf, No. 415, 1877.

California : Michener & Bioletti, 1893; J. Torrey, 1865.

Idaho : Watson, No. 113, 1880.

***Drymocallis glandulosa monticola*.**

Potentilla glandulosa var. *Nevadensis* Wats. Bot. Cal. **1** : 178 (in part) 1876. Not *Potentilla Nevadensis* Boiss.

Rothrock, Wheeler's Rep. **4** : 112; Rattan, Key W. Coast Bot. 51; Vasey & Rose, Cont. U. S. Nat. Herb. **1** : 6; Greene, Fl. Fran. **1** : 65.

More slender than the type; stem leaves reduced in size; leaflets smaller; stem more finely and densely pubescent upward; cyme more contracted and few-flowered, and stamens often only 20.

I regard this as a mountain variety of *D. glandulosa* rather than a distinct species. It

differs only in its more slender habit, a slightly denser pubescence, somewhat shorter sepals and a more contracted and few-flowered cyme, a modification perhaps due to the higher altitude. Intermediate forms are not rare. It is common in the higher Sierras of California, Nevada and Oregon. Specimens seen :

California : W. H. Brewer, Nos. 1767, 1705 and 2715, 1863 ; W. G. Wright, No. 15, 1880 ; Geo. Hansen, No. 296.

Nevada : C. L. Anderson, 1864.

Oregon : H. M. Cronkhite.

Montana : F. D. Kelsey, 1891.

Idaho : Henderson, No. 3599, 1896.

7. *Drymccallis Hanseni* (Greene).

Potentilla Hanseni Greene, Pittonia, 3: 20. 1896.

Potentilla glandulosa var. *Nevadensis* Greene, Fl. Fran. 65. Not Wats.

Stem 5–8 dm. high, rather slender, finely and densely villous, especially the upper part, less glandular than the preceding, simple below, branched above, with nearly erect branches. Stipules lanceolate. Basal leaves with petioles 3–6 cm. long, more or less puberulent, pinnate with 4 or 5 pairs of leaflets, which are rounded-obovate, obtuse, or the upper ones acute, coarsely serrate, 1–4 cm. long ; stem leaves smaller, 3–5-foliolate, with acute leaflets. Flowers in a narrow cyme, 8–12 mm. broad. Hypanthium densely hirsute ; bractlets linear-lanceolate, less than half the length of the ovate acute sepals. Petals yellow, broadly obovate or almost orbicular, a little exceeding the calyx. Stamens about 25. Style thickened and glandular.

It is nearest related to *D. glandulosa*, from which it does not differ materially in size, the form of the leaves, or in the size and color of the flowers. The main distinctions lie in the denser, less glutinous pubescence, the more upright branches, and the smaller bractlets.

California : E. L. Greene (Calaveras Co.), 1889.

8. *Drymocallis Ashlandica* (Greene).

Potentilla ciliata Howell, Fl. N. W. Am. 1: 175. 1898. Not Greene.

Potentilla Ashlandica Greene, Pittonia, 3: 248. 1898.

Stems several from a creeping rootstock, 2–3 dm. high, slender, finely and densely villous or pilose, especially the upper portion, scarcely at all glandular, simple below, above branched with erect or nearly ascending branches ; stipules linear to obovate, more or less lacerate-toothed. Basal leaves with short petioles, more or less pilose, with 2–4

pairs of leaflets, which are obovate, 1–2.5 cm. long, coarsely and doubly serrate. Stem leaves smaller, 3–5-foliolate, with acute or acuminate leaflets. Flowers in a narrow cyme, 15–20 mm. in diameter. Hypanthium densely long-pilose, not glandular; bractlets linear, or linear-lanceolate, usually less than half the length of the broadly ovate sepals. Petals yellow, orbicular or broadly obovate, 12–15 mm. long, exceeding the sepals by about a half. Stamens 25. Style thickened and glandular.

A very near relative of the preceding, differing practically in no respect from it except in the larger flowers and perhaps in being slightly lower in habit. It grows in wet meadows.

Oregon: Siskiyou Mountains, near Ashland Butte, Thomas Howell, 1897, No. 686.

9. *Drymocallis glabrata*.

ILLUSTRATIONS: PLATE 109, *f. 1*; fruiting hypanthium and calyx, *f. 2*; pistil, *f. 3*.

Stems several from a branching caudex, sparingly pubescent with long, almost arachnoid hairs, in age glabrous, not at all glandular or viscid, branched above, the branches slender, divergent. Stipules obovate, entire or somewhat toothed. Basal leaves with long slender petioles, thin, in age almost glabrous, with 3 or 4 pairs of leaflets, which are obovate-cuneate, obtuse, entire at the base, the upper half coarsely toothed. Stem leaves with 3–5 leaflets, short-petioled or sessile. Flowers large, nearly 2 cm. in diameter, in an open cyme with slender diverging branches. Hypanthium sparingly silky-villous, in age almost glabrous; bractlets linear-oblong, scarcely half as long as the broadly ovate sepals. Petals light yellow, large, suborbicular, 12–15 mm. long, more than half longer than the calyx. Stamens 25–30. Style thickened and glandular.

It is perhaps nearest related to *D. Ashlandica*, but differs in the slender divergent branches of the cyme and the pubescence, which is unusually sparse for the genus. It grows on foothills.

Washington: (Ellensburg) A. D. E. Elmer, No. 412, 1897.

10. *Drymocallis Wrangelliana* (Fisch. & All.).

Potentilla Wrangelliana Fisch. & All. Anim. Bot. Ind. Sem. Hort. Bot. Petr. 1840: 54. Linnaea, 15: 118; Ann. Sci. Nat. (II) 16: 57; Lehm. Rev. Pot. 49; Davy, Erythraea, 2: 166, 1894; Walp. Rep. 2: 35; Ann. 2: 476.

? *Potentilla rupestris* Presl, Epim. Bot. 198. 1849 (fide Lehm.).

Potentilla glandulosa Hook. & Arn. Bot. Beechey, Suppl. 338 (at least in part).

Torr. Pac. R. R. Rep. 4: 84; Bot. Mex. Bound. 64; Gray Proc. Am. Acad. 8: 381; Brew. & Wats. Bot. Cal. 1: 178; Wats. Proc. Am. Acad. 8: 552 (in part); Behr, Fl.

Vic. San Fran. 249; Greene, Fl. Fran. 1: 65; Erythea, 1: 82; Man. Bay Reg. 115; Rattan, Key W. Coast Bot. 51; K. Brandegee, Zoe, 2: 349; T. S. Brandegee, Zoe. 4: 205; Davidson, Erythea, 2: 30.

Potentilla Oregana Nutt.; Torr. & Gr. Fl. N. Am. 1: 446. As synonym. 1840.

ILLUSTRATIONS: Lehm. Rev. Pot. pl. 19. PLATE 108.

Stem tall, 4–8 dm. high, striate, leafy, branched, glandular or viscid, villous. Lower stipules ovate-lanceolate, the upper ovate, small, 3–10 mm. long, generally entire. Basal leaves with petioles 2–10 cm. long, sparingly hairy, pinnate; leaflets 3 or 4 pairs, obovate or nearly orbicular, the upper inclined to be somewhat rhomboid and often 5–6 cm. long, all more or less doubly serrate. Stem leaves short-petioled and with fewer leaflets, which, however, are not much reduced in size, the upper ones only trifoliolate and often opposite. Cyme open, generally dichotomously branched with a short-pedicelled flower in the angle. Pedicels always short, or scarcely any. Hypanthium glandular-hirsute, enlarged in fruit. Bractlets linear-oblong, acute, shorter than the sepals, which are oval, abruptly contracted into a mucronate tip, more reticulate-veiny and thinner than in *D. glandulosa*. Petals pale yellow, obovate, about the length of the calyx.

This species most resembles *D. glandulosa*, but differs by the larger, more decidedly double-serrate leaflets, the more leafy cyme, which is dichotomously branched, with a short-pedicelled flower in the forks, but principally by the sepals, which are more veiny, oval (not ovate-lanceolate), and abruptly contracted into a small tip, almost mucronate.¹ The common form is inclined to become glabrate. Lindley's figure of *P. glandulosa incisa* in Bot. Reg. 23: pl. 1973, resembles this species as to the leaves, but the cyme and the sepals are those of *D. glandulosa*. *D. Wrangelliana* is common in California and Oregon, extending into Washington.

P. Oregana Nutt. Mss., is a form of this species, but the stem is glandular and very pubescent with long villous hairs. Torr. & Gray, Fl. N. Am. 1: 446, place it as a synonym of *P. glandulosa*, but its habit and sepals show a close relationship with *D. Wrangelliana*. Specimens seen:

California: Many collectors.

Oregon: Douglas, 1822; Nuttall; Tolmie; E. Hall, No. 134, 1871; T. Howell, No. 109, 1877.

Washington: C. V. Piper, No. 78, 1888; Wilkes' Exp.; W. H. Suksdorf, No. 2209, 1893; No. 1761, 1861.

Idaho: A. A. & Gertrude Heller, No. 3130, 1896.

¹ As at least one specimen of Douglas' collection belongs to this species, it might be taken for *P. glandulosa* Lindley, described from specimens from the same collector, but Lindley's figure shows that *P. glandulosa* is the plant with lanceolate sepals.

11. *Drymocallis reflexa* (Greene).

Potentilla glandulosa var. *reflexa* Greene, Fl. Fran. **1**: 65. 1891.

Potentilla reflexa Greene, Pittonia, **3**: 19. 1896.

Rydberg, Bull. Torr. Bot. Club, **23**: 247.

ILLUSTRATIONS: PLATE 110, *f. 1*; dissection of flower, *f. 2*; petal, *f. 3*; pistil, *f. 4*; stamen, *f. 5*; fruiting hypanthium and calyx, *f. 6*.

Stems generally several from the caudex, slender, branched, more or less tinged with purple, 3–4 dm. high, minutely villous. Stipules lanceolate to ovate, entire or toothed. Basal leaves many, rather short-petioled, finely silky-hirsute, rather firm in texture, pinnate; leaflets about 4 pairs, 1–3 cm. long, broadly oval or obovate, coarsely serrate with broad teeth, sometimes somewhat incised. Stem leaves 5-foliolate or ternate, more acute. Cyme open, with rather long slender branches. Flowers about 1 cm. in diameter. Hypanthium rather densely short viscid-villous, in fruit 10 mm. in diameter; bractlets ovate-lanceolate, scarcely half as long as the ovate or ovate-lanceolate acute or mucronate sepals. Petals dark yellow, obovate, scarcely equalling the sepals, both reflexed in anthesis. Stamens about 25; filaments short; anthers deeply cordate at the base.

This somewhat resembles *D. glandulosa*. The principal difference given by Professor Greene is that petals and sepals are reflexed in anthesis. As far as I know the species, the following characters may be added: thicker, darker leaves with broader and shorter teeth, a more slender stem which is inclined to be tinged with red, and a fruiting hypanthium scarcely larger than that of the next species. According to Professor Greene, it is common in dry open pine woods of the foothills of the Sierra Nevada. I have seen specimens from the following collections:

California: Bolander, No. 6296, 1866; E. Palmer, 1888; E. L. Greene, 1876; 1889; Fritchey, 1891; Coville & Funston, No. 1355, 1891; Geo. Hansen, No. 64, 1891; S. B. Parish, Nos. 291, 1885, No. 3163, 1894 and No. 2364, 1892; Mrs. R. M. Austin, 1895; C. F. Sonne, No. 76, 1874; Mrs. Dodd, 1891; C. C. Parry, 1881; T. S. Brandegees, 1892; Alice Eastwood, 1893; 1895; Parry & Lemmon, No. 94, 1876; W. C. Blasdale, 1895.

Vancouver Island: (?) J. Macoun, No. 181, 1893; No. 7274, 1897.

Oregon: T. Howell, 1886.

Idaho: (?) J. H. Sandberg.

12. *Drymocallis rhomboidea*.

Potentilla rhomboidea Rydberg, Bull. Torr. Bot. Club, **23**: 248. 1896.

ILLUSTRATIONS: PLATE 112, *f. 1*; dissection of flower, *f. 2*; stamen, *f. 3*; pistil, *f. 4*; fruiting hypanthium and calyx, *f. 5*.

Stem low and slender, about 2 dm. high, simple, about 3-leaved, not striate, nearly glabrous, or glandular above with very short hairs. Stipules small, 2–4 mm. long, ovate, subentire. Basal leaves many, short-petioled; leaflets about 3-pairs, smooth or beset with a few scattered hairs, rhombic-ovate, mostly acute, serrate with acute teeth, the largest ones 1.5 cm. long, seldom 2 cm. Stem leaves about 3, similar, the lowest with about 2 pairs of leaflets, short-petioled, the other two generally 3-foliolate and subsessile. Flowers few in open cymes, about 1 cm. in diameter. Hypanthium glandular with very short hairs, sometimes also with a few long ones; sepals about 8 mm. long in fruit; bractlets linear-oblong, obtuse or acutish, half the length of the broadly ovate, slightly mucronate sepals. Petals yellow, obovate, a little exceeding the sepals. Stamens 15–20. Style nearly basal, filiform, long and slender, in fruit about twice as long as the smooth achene.

It somewhat resembles depauperate *D. glandulosa*, but differs by its longer filiform style, which is not fusiform, by the pubescence, which could be called glandular-pruinose, when present, with a few scattered straight hairs on the hypanthium and the leaves, and by the small fruiting calyx. It also simulates *Potentilla brevifolia*, but in the latter the style is not basal and the petals are emarginate.

D. rhomboidea is apparently a rare plant. The following specimens have been seen.

Nevada: S. Watson.

Montana: S. Watson, No. 114.

Washington: W. N. Suksdorf, No. 742 (Mt. Paddo), 1885; No. 119, 1882.

Oregon: Thomas Howell (Deer Creek Mts.), Nos. 1128, 128 and 687, 1887; Rev. R. D. Nevius, 1873.

13. *Drymocallis cuneifolia*.

ILLUSTRATIONS: PLATE 111, *f. 1, 2*; dissection of flower, *f. 3*; pistil, *f. 4*; stamen, *f. 5*; fruiting hypanthium, *f. 6*.

Stem erect, 3–4 dm. high, with few divergent branches, sparingly and finely silky-villous, scarcely at all glandular. Stipules broadly ovate, entire or toothed. Basal leaves several, with slender petioles, pinnate; leaflets 2–4 pairs, finely silky-villous, broadly cuneate-flabelliform, coarsely toothed at the apex, entire-margined below. Stem leaves with 1 or 2 pairs of similar leaflets. Cyme open, with divergent branches and slender pedicels. Hypanthium finely silky, almost hemispheric, 6–7 mm. in diameter; bractlets narrowly linear, much shorter than the broadly ovate acute sepals. Petals erect, obovate, scarcely exceeding the sepals. Stamens about 20; anthers flat, slightly cordate at base. Style nearly filiform, much longer than the achenes.

This species differs from all the others in the small flowers with erect petals and the cuneate-flabelliform leaflets. It is evidently a very rare plant.

California: S. B. Parish, No. 1818, 1886, from the San Bernardino Mountains.

13. CHAMAERHODOS Bunge.

Sibbaldia L. Sp. Pl. 284. In part. 1753.

Chamaerhodos Bunge, in Ledeb. Fl. Alt. 1: 429. 1829.

Hypanthium cup-shaped, small. Petals and sepals 5; bractlets wanting. Petals obovate or cuneate, somewhat clawed. Stamens 5, opposite the petals; filaments subulate, short, persistent; anthers didymous, opening by a slit. Pistils 5–10, or more; style basal, filiform. Seed inserted near the base of the style, ascending and nearly orthotropous.

Small biennial or perennial, branching plants, generally glandular-pubescent and with finely dissected leaves and dichotomous cymes. The genus consists of about half a dozen species, all natives of Northern Asia, one also extending into northwestern America.

1. *Chamaerhodos erecta* (L.) Bunge.

Sibbaldia erecta L. Sp. Pl. 284. 1753.

Sp. Pl. Ed. 2: 407; Willd. Sp. Pl. 1: 1567; Pers. Syn. Pl. 1: 341; Spreng. Syst. 1: 956; DC. Prod. 2: 587; Roem. & Schult. Syst. 6: 769; Dietr. Syn. Pl. 2: 1020; Pursh, Fl. Sept. Am. 211.

Chamaerhodos erecta Bunge, in Ledeb. Fl. Alt. 1: 430. 1829.

Don, Gard. Dict. 2: 562; Walp. Rep. 2: 37; Ledeb. Fl. Ross. 2: 33.

Torr. & Gray, Fl. N. Am. 1: 433; Torr. Nicol. Rep. 149; Gray, Pac. R. R. Rep. 12: 43; Proc. Acad. Phil. 1863: 61; Porter, Hayd. Rep. 1871: 481; Porter & Coult. Fl. Col. 35; Coult. Man. Rocky Mts. 86; Rothrock, Bot. Wheeler Surv. 114.

Sibbaldia erecta var. *parviflora* Nutt. Gen. 1: 207. 1818.

Eat. & Wr. N. Am. Bot. 424.

Chamaerhodos erecta var. *Nuttallii* Torr. & Gray, Fl. N. Am. 1: 443. 1840.

ILLUSTRATIONS: Lam. Ill. pl. 221, f. 2; Amman, Ruth. pl. 15. PLATE 112, f. 6; dissection of flower, f. 7; pistil, f. 8; stamen, f. 9; fruiting hypanthium and calyx, f. 10.

Plant 1–3 dm. high, erect, branching and leafy, hirsute and glandular. Basal leaves numerous and rosulate, 2–4-ternately divided into linear or oblong divisions. Stem leaves also numerous, similar but smaller and less divided. Hypanthium 2–3 mm. in diameter, hispid; sepals narrowly lanceolate, equalling or somewhat shorter than the white obovate-cuneate petals.

Rather common on the dry plains of northwestern America from Saskatchewan to South Dakota, Wyoming and northwestward. Also common in Siberia.

Additions and Corrections.

After most of the manuscript of this monograph had gone through the press, Mr. Greenman, of the Gray Herbarium, kindly submitted to me some Mexican *Potentillae* for determination. One of these happens to be undescribed; as it could not be printed in its proper place, I append it here.

Potentilla Oaxacana.

Perennial from a stout tap-root; stem 4-5 dm. high, rather densely pilose, ascending, few-leaved. Basal leaves not very thick, rather densely pilose, less so on the upper surface; petioles 5-7 cm. long, striate, silky-villous; leaflets 5, broadly obovate, coarsely crenate, about 5 cm. long, strongly veined; stem leaves smaller, with 3 leaflets, the lower short-petioled, the uppermost sessile. Lower stipules lanceolate, more or less scarious, the upper broadly ovate, herbaceous, and often toothed. Cyme rather open. Flowers about 15 mm. in diameter. Hypanthium pilose; bractlets oblong, nearly equaling the ovate sepals. Petals yellow, obovate, exceeding the sepals by fully one-half. Stamens 20-25.

It belongs to the *gracilis* group, and is intermediate between *P. fastigiata*, *P. subcoriacea* and *P. staminea*. It most resembles the first in the form and the pubescence of the leaves, but is a larger plant, with more open cyme, larger flowers and denser pubescence. *P. subcoriacea* is easily distinguished from it by its dark green, shining subcoriaceous leaves, and *P. staminea* by the tomentum and the greater number of stamens.

Mexico, State of Oaxaca (Cuatro Venados, alt. 8500 ft.): Rev. L. C. Smith, No. 47, 1894.

On pp. 1, 10 and 19, *Dasiphora* should be substituted for *Comocarpa*. I adopted Torrey & Gray's subgeneric name for the genus whose type is *Potentilla fruticosa* L., not knowing that the genus had been named *Dasiphora* by Rafinesque in his *Antikon*. I am indebted to Professor Greene, of the Catholic University, Washington, for information concerning this name, as no reference to *Dasiphora* is found either in the Kew Index or in the Nomenclators of Steudel and Pfeifer.

On p. 23, read *P. longipedunculata* instead of *P. longipes*.

On p. 40, add to the list of specimens under *P. heterosepala Mexicana*: C. G. Pringle, No. 5693, 1894 (unusually large specimens from the State of Oaxaca).

On p. 62, add to the list of specimens under *P. Ranunculus* Lange:

Labrador (Cape Chudley): J. D. Sornborger, No. 24, 1896.

This species is therefore to be added to those growing on the North American continent.

On Plate 28 read *Potentilla ctenophora* instead of var. *ctenophora*.

On Plate 101 read *Dasiphora fruticosa* instead of *Comocarpa fruticosa*.

GEOGRAPHIC DISTRIBUTION OF THE POTENTILLEAE OF NORTH AMERICA.

	Potentilla.	Horkelia.	Stellariopsis.	Comarella.	Argentina.	Comarum.	Duchesnea.	Fragaria.	Sibbaldia.	Sibbaldiopsis.	Dasiphora.	Drymocalis.	Chamaerhodos.	Total Species.
Greenland	10				2	1			1	1				15
Labrador and Baffin Bay.....	10				2	1		1	1	1	1			17
Arctic Coast.....	9				1	1			1					12
Alaska	9				2	1		2	1		1			16
British Columbia	10				2	1		4	1		1	2	1	22
Canadian Rocky Mountains	16				1	1		3	1		1	4	1	28
Saskatchewan Region	20				1	1		3			1	2	1	29
Canada	5				1	1		4	1	1	1	1		16
New England and Middle States	12				2	1	1	5	1	1	1	1		25
Southern States	3						1	2		1		1		8
Prairie Region	11				1			4				1		17
Great Plains	17	1			1			2			1	3	1	26
Rocky Mountains	42	1			1	1		8	1		1	6	1	61
Oregon-Washington	19	5			2	1		5			1	9	1	53
California.....	12	36	1		1	1	1	4	1		1	6		64
Great Basin	4	10		1	1			4	1		1	2		23
Texas-Arizona	20			1	1			3				2		27
Northern Mexico	7							1						8
Lower California	3	3						1						7
Southern Mexico	18							1						19
Central America	1							1						2
Confined to 1 region	49	33	1	2				6				6		97
Common to 2 or 3 regions	39	13					1	7				5		65
Common to 4-12 regions	17	1			1	1		7	1	1	1	2	1	33
Generally distributed	2				1									3
Total.....	107	47	1	2	2	1	1	20	1	1	1	13	1	198
Native	99	47	1	2	2	1		19	1	1	1	13	1	188
Introduced	8						1	1						10
Native also of Europe	10				1					1				12
Native also of Asia	8						1						1	10
Native also of Europe and Asia	6				1	1		1	1		1			11

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EXPLANATION OF PLATE I.

Fig. 1. Part of the flower of *Drymocallis convallaria*, showing staminiferous disk and two festoons of stamens.

Fig. 2. Part of the flower of *Potentilla Nuttallii*, showing the arrangement of stamens.

Fig. 3. Part of the inside of the hypanthium in *Horkelia argyrocoma*, showing the arrangement of the fibrovascular bundles.

Fig. 4. Section of the receptacle of *Fragaria Californica*.

Fig. 5. Pistil of *Drymocallis convallaria*.

Fig. 6. Pistil of *Potentilla Nuttallii*.

Fig. 7. Pistil of *Argentina Anserina*.

Fig. 8. Diagram of flower of *Horkelia argyrocoma*.

Fig. 9. Diagram of flower of *Potentilla Nuttallii*.

Fig. 10. Diagram of flower of *Potentilla biennis*.

Fig. 11. Diagram of flower of *Chamaerhodos erecta*.

Fig. 12. Diagram of flower of *Comarella multifoliolata*.

Fig. 13. Diagram of flower of *Drymocallis convallaria*.

Fig. 14. Diagram of flower of *Potentilla sulphurea*.

Fig. 15. Diagram of flower of *Stellariopsis santalinoides*.

b. bractlets.

ap. antipetalous stamens.

g. gynoecium.

as. antisepalous stamens.

p. petals.

pp. parapetalous stamens.

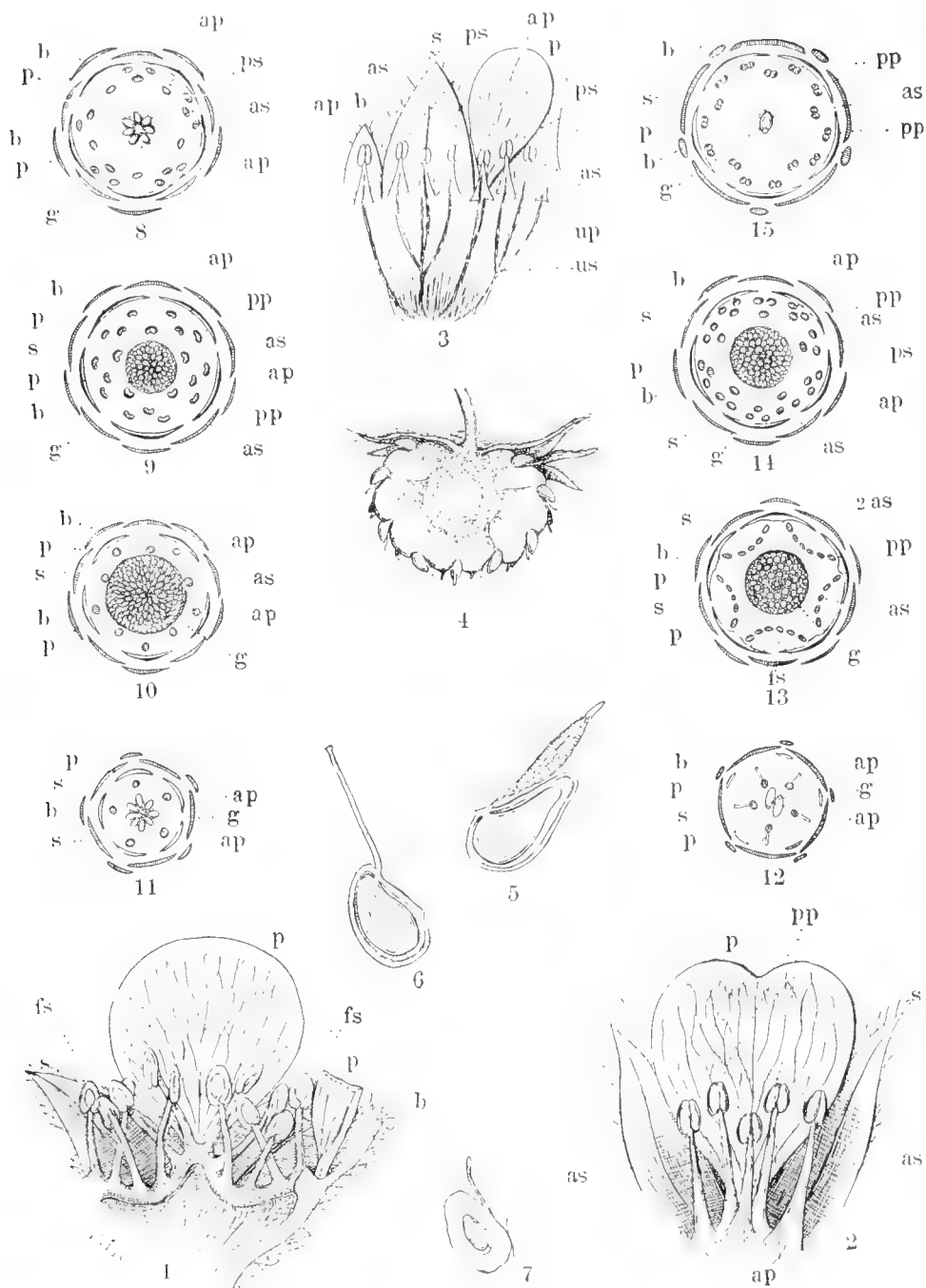
s. sepals.

ps. parasepalous stamens.

fs. festoons of stamens.

up. point of union of the fibrovascular bundles from the stamens and the petals.

us. point of union of the fibrovascular bundles from the stamens and the sepals.

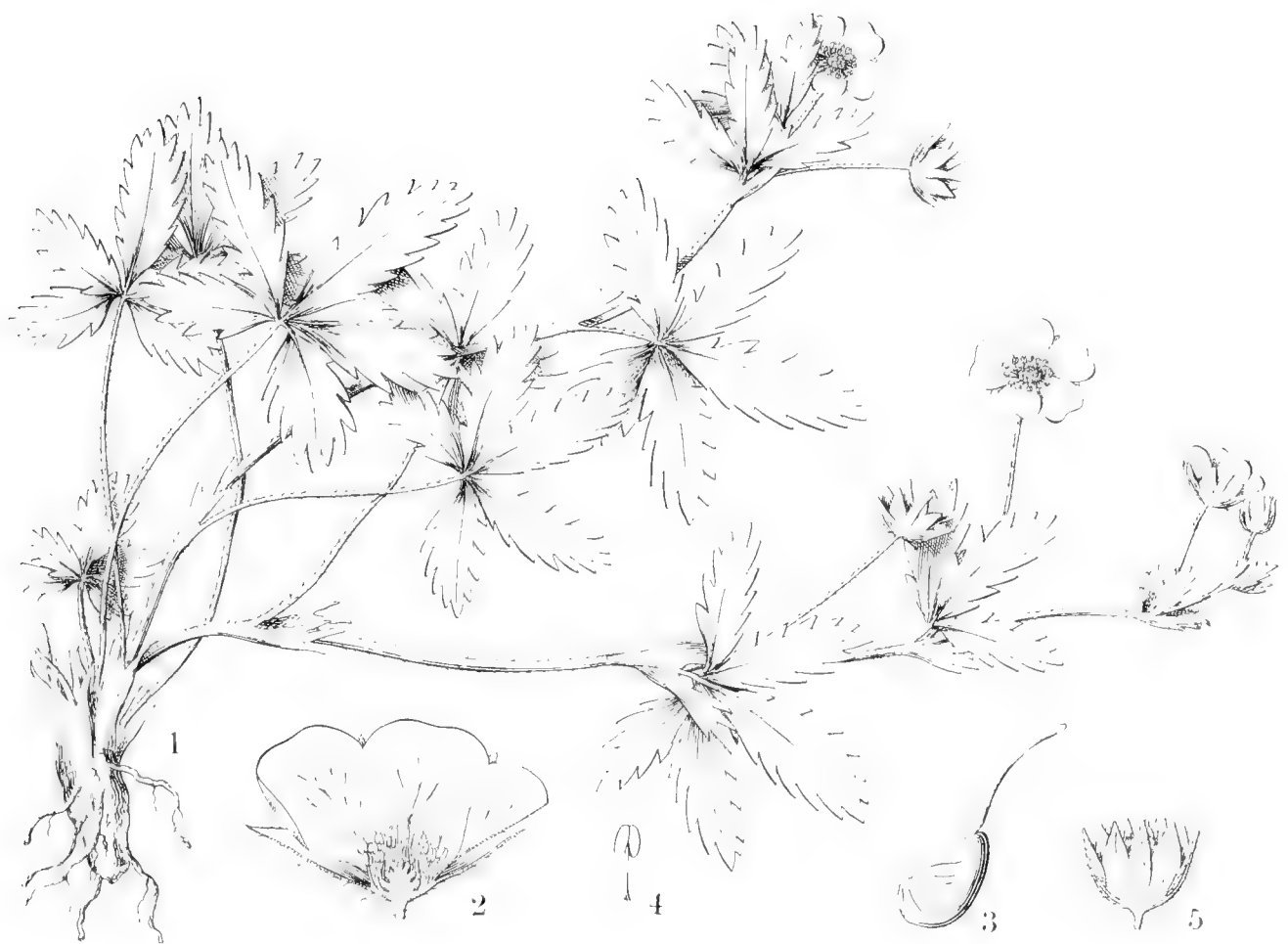




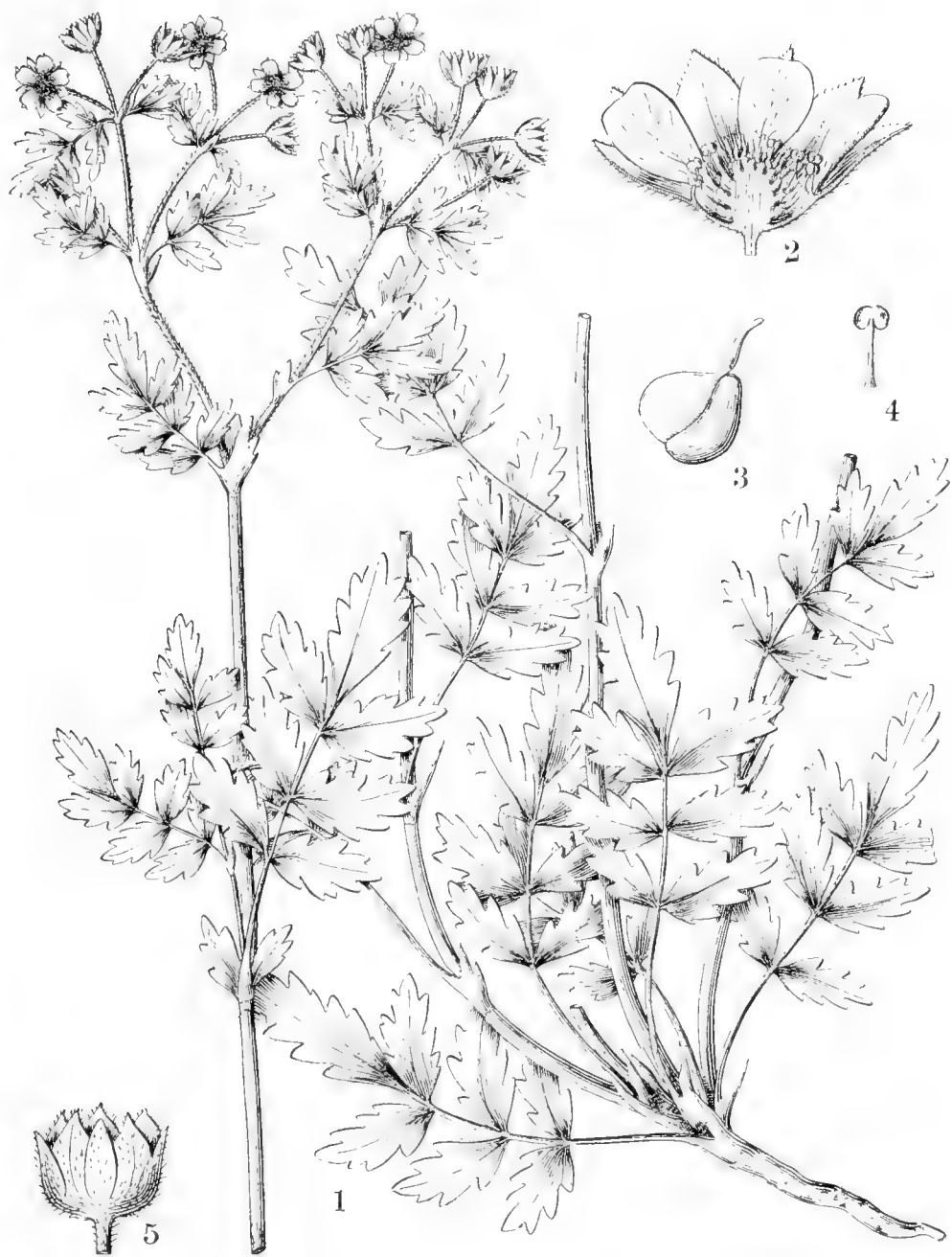
POTENTILLA THURBERI



POTENTILLA ATRORUBENS



POTENTILLA CANADENSIS



POTENTILLA PARADOXA



POTENTILLA NICOLLETH



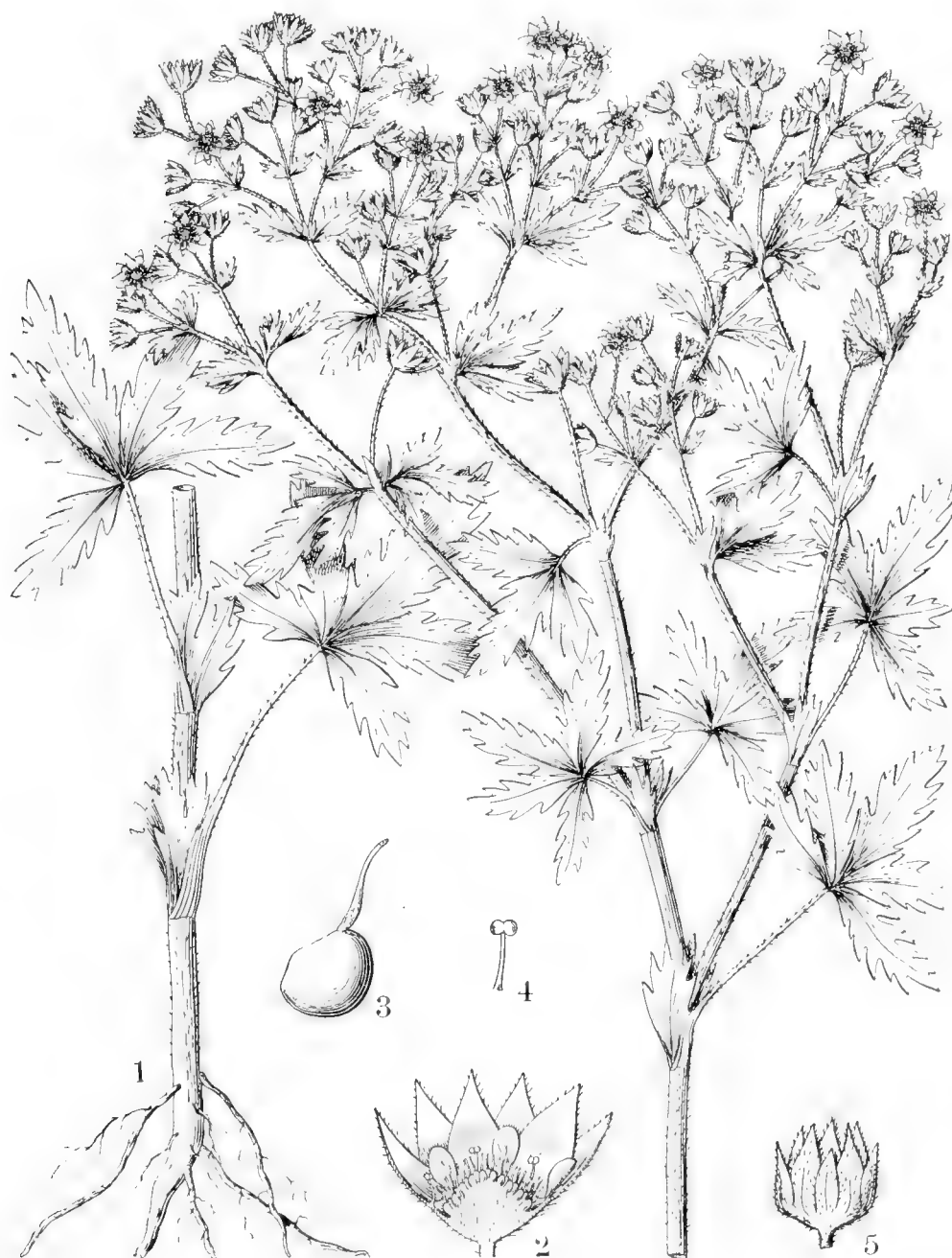
POTENTILLA RIVALIS



POTENTILLA LEUCOCARPA



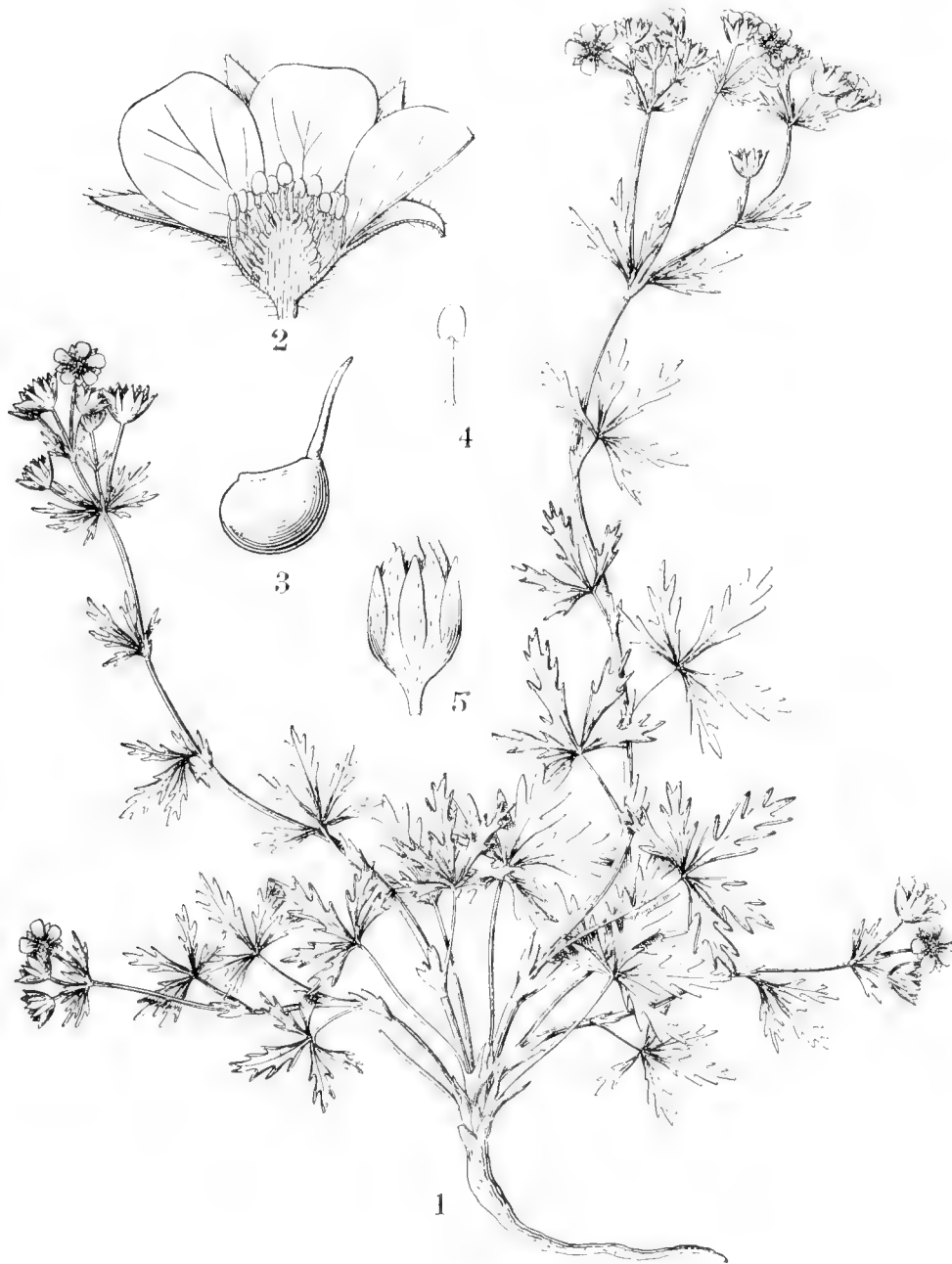
POTENTILLA BIENNIS



POTENTILLA PENTANDRA



POTENTILLA INTERMEDIA



POTENTILLA ARGENTEA



POTENTILLA CONCINNA



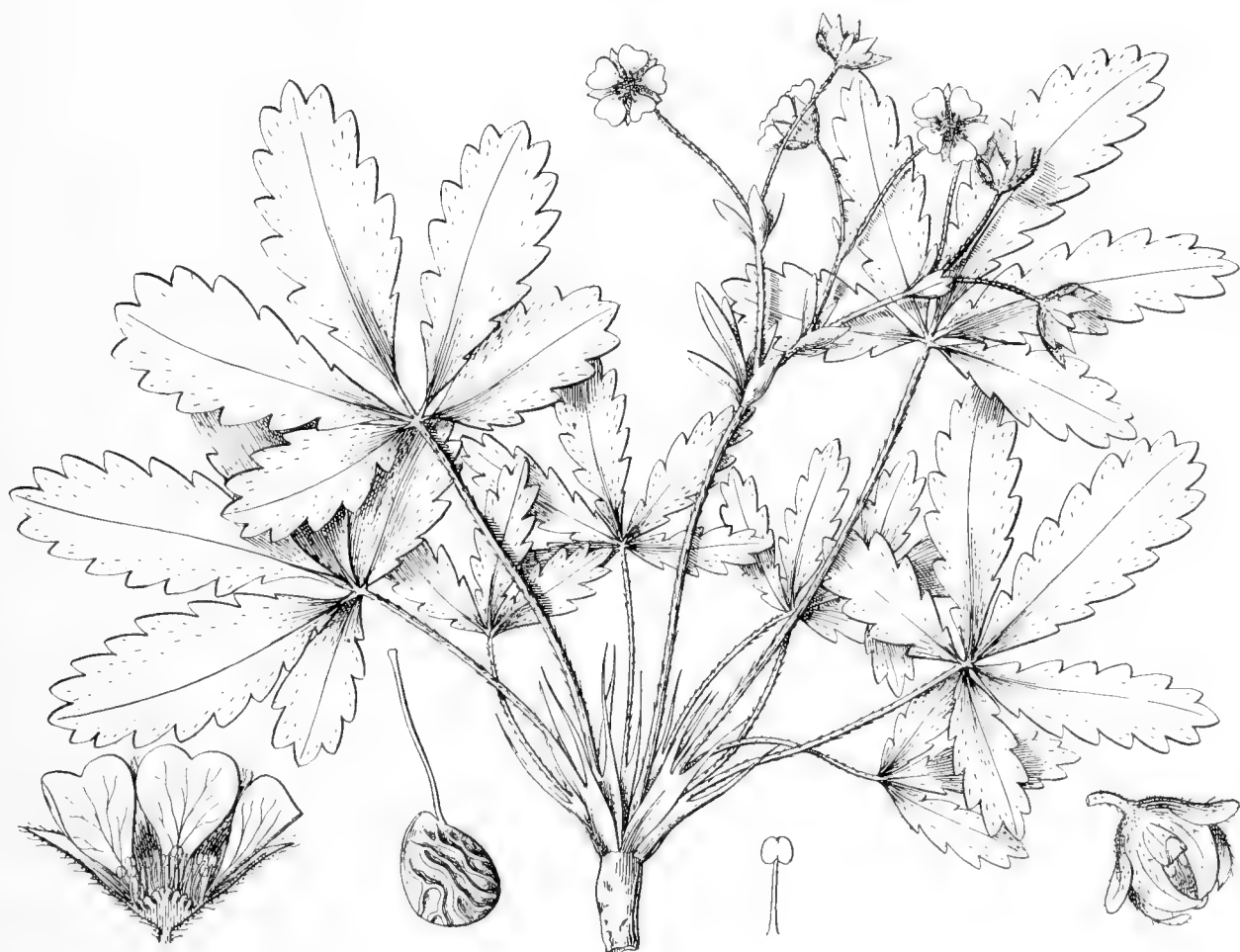
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6-10 POTENTILLA CONCINNIFORMIS

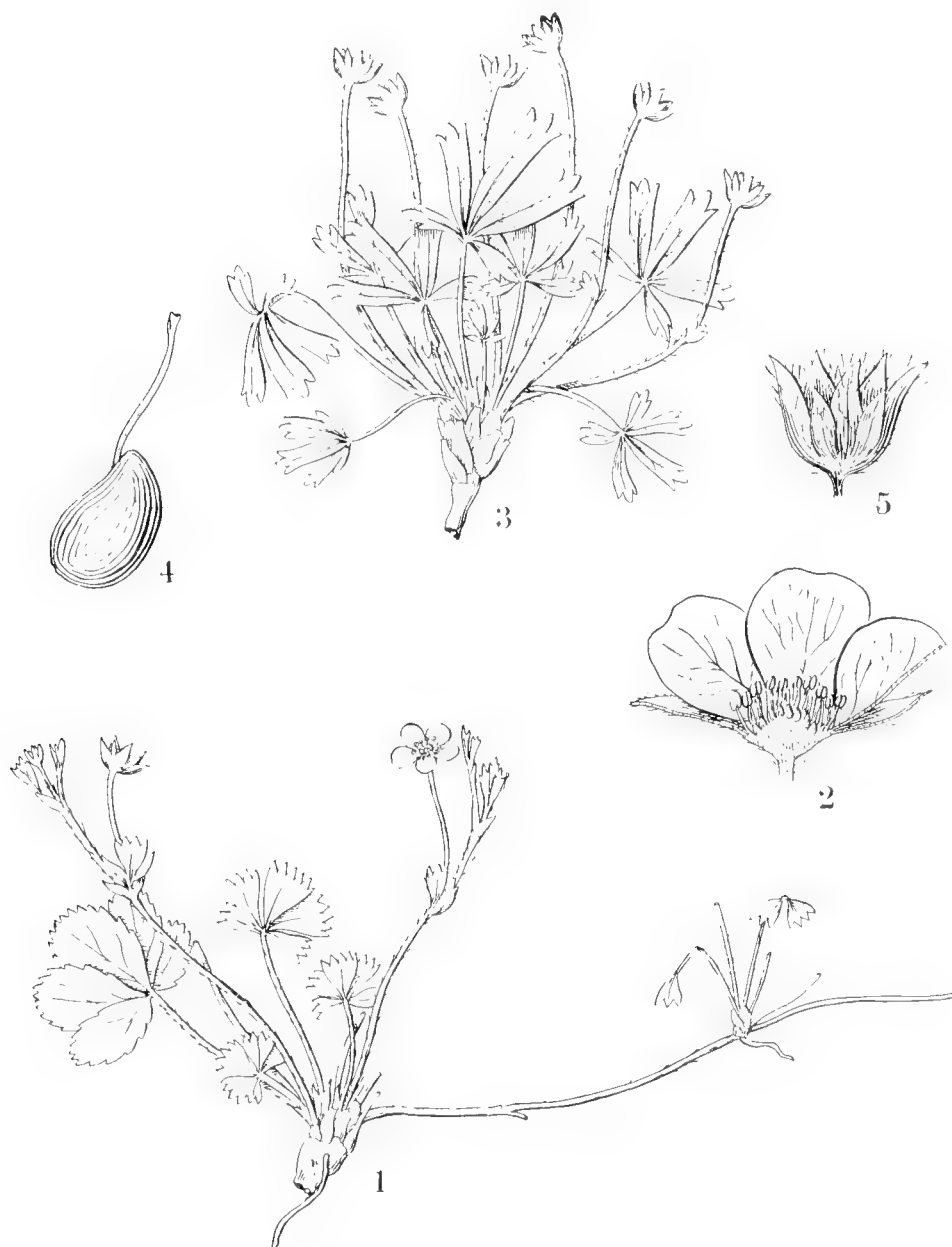


1-5 POTENTILLA WHEELERI

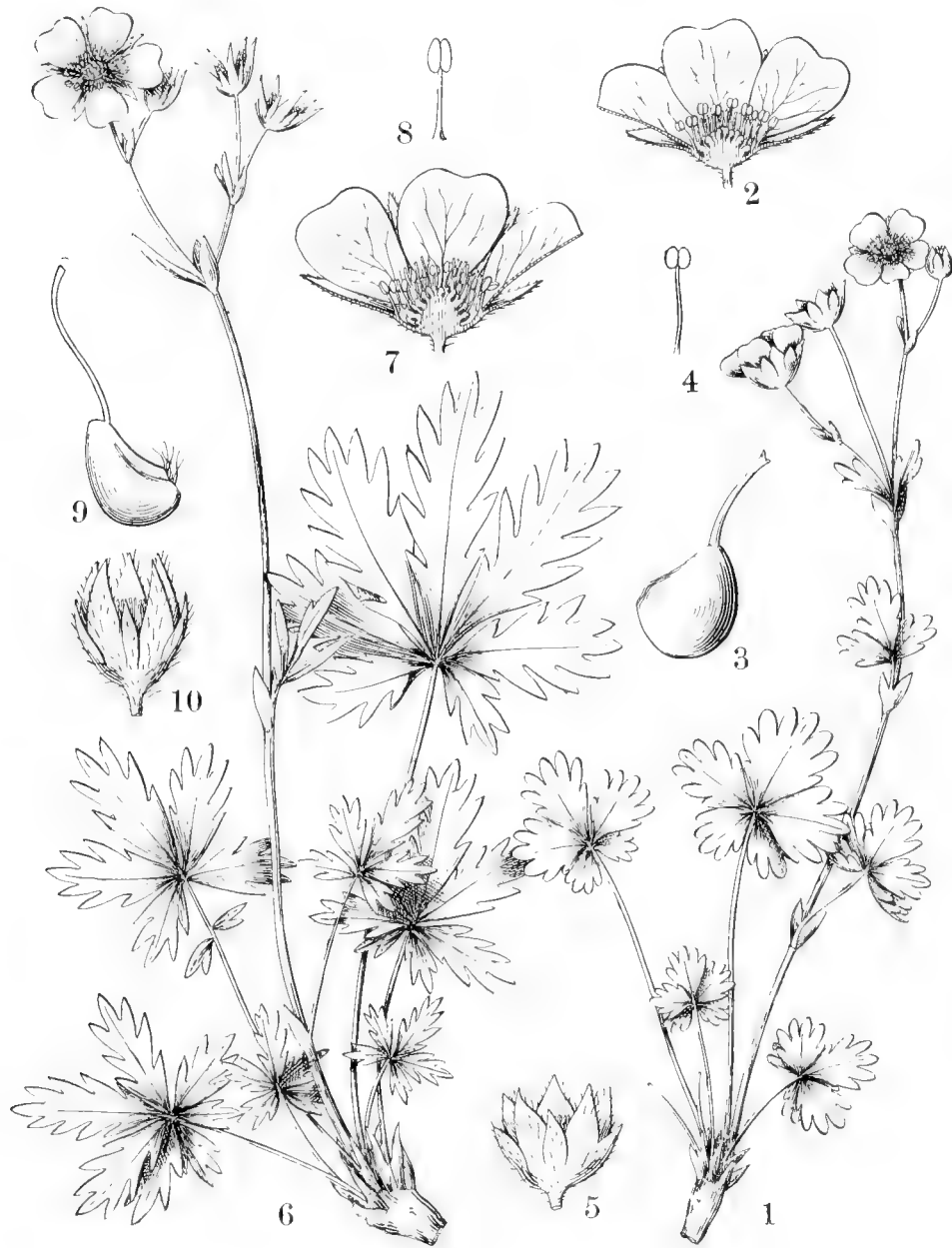
6-10 POTENTILLA SUBVISCOSA



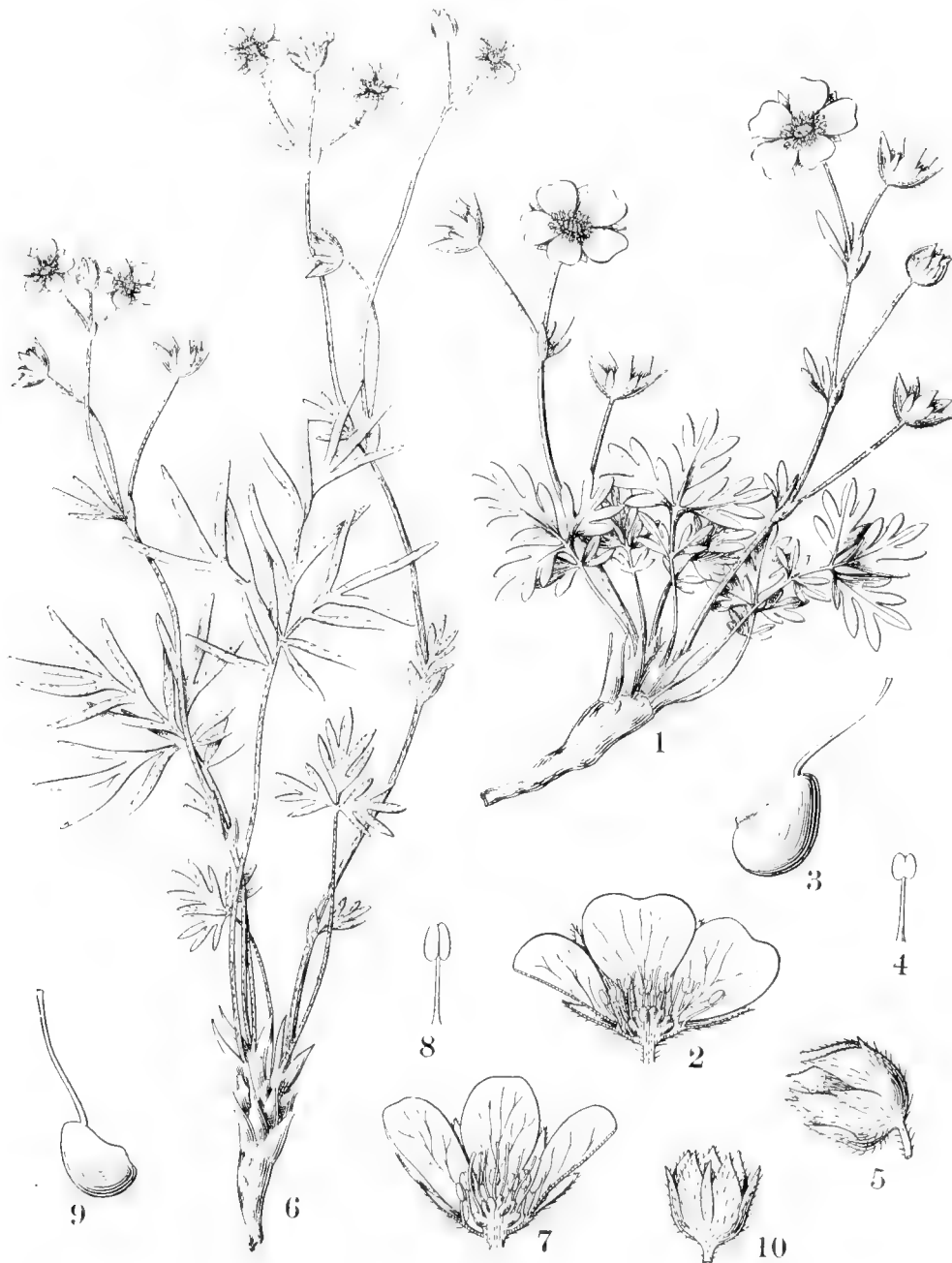
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1-2 *POTENTILLA PUMILA* 3-5 *POTENTILLA SIERRAE-BLANCAE*

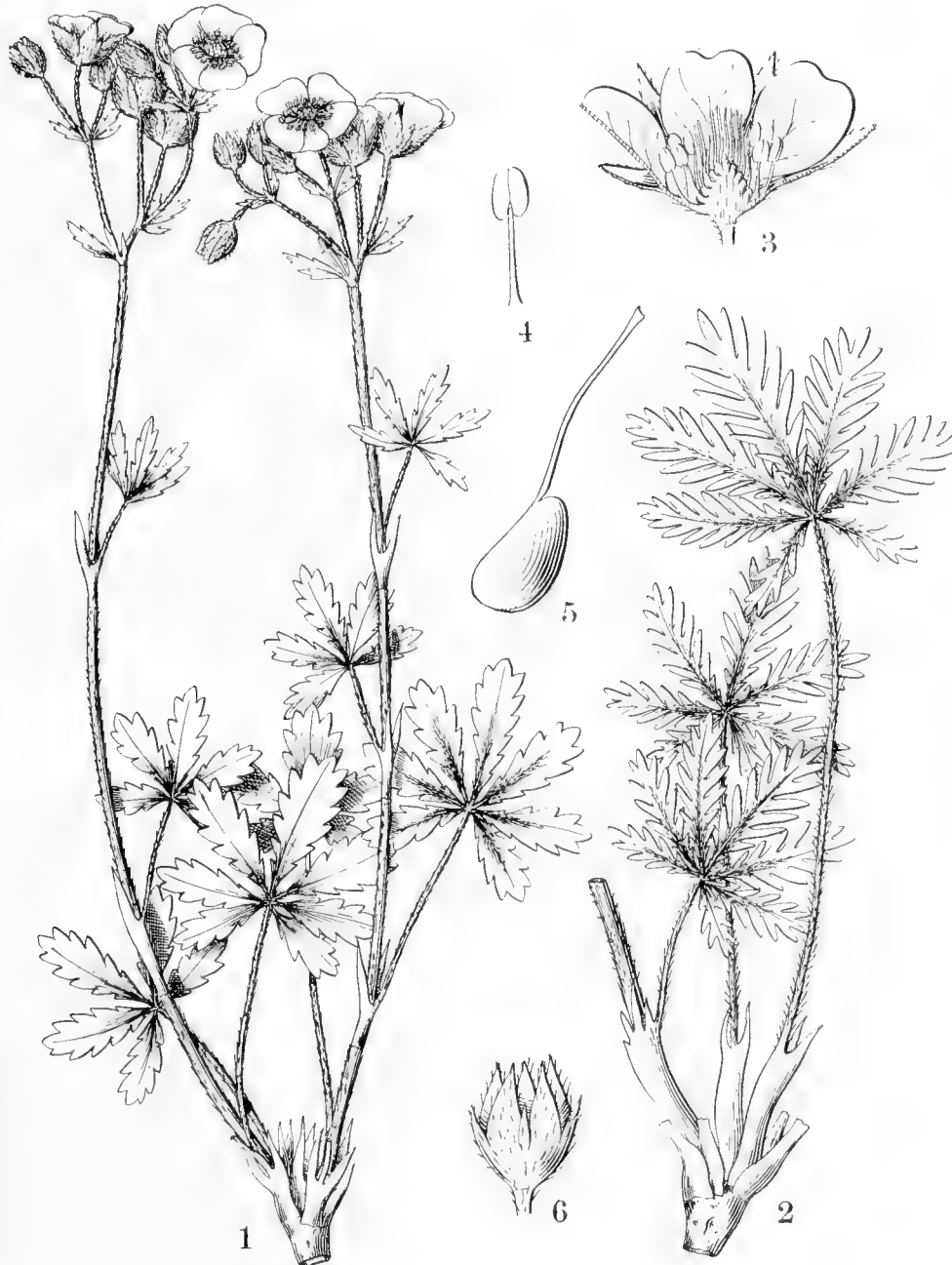


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1-5 POTENTILLA DECURRENS

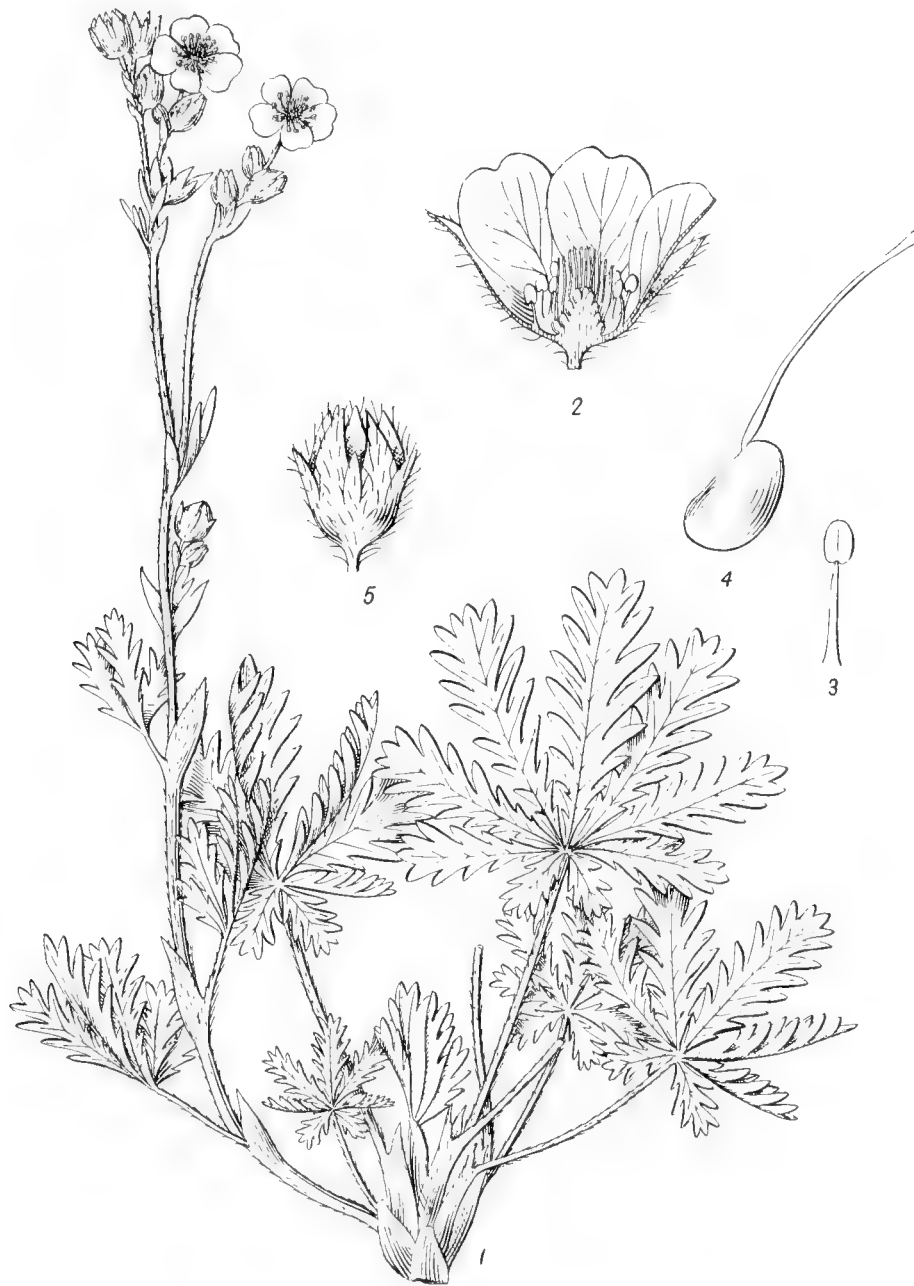
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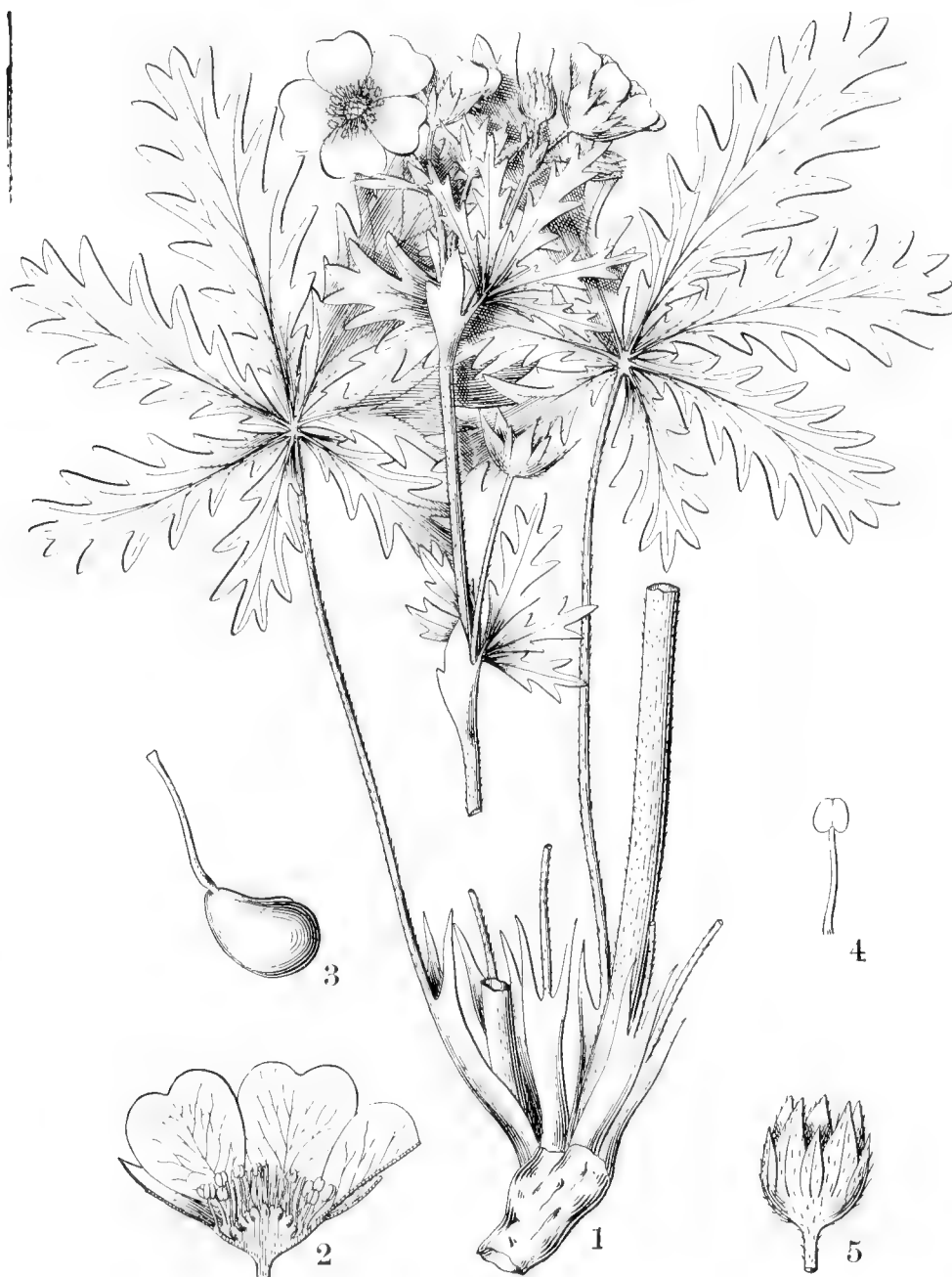
POTENTILLA PULCHERRIMA



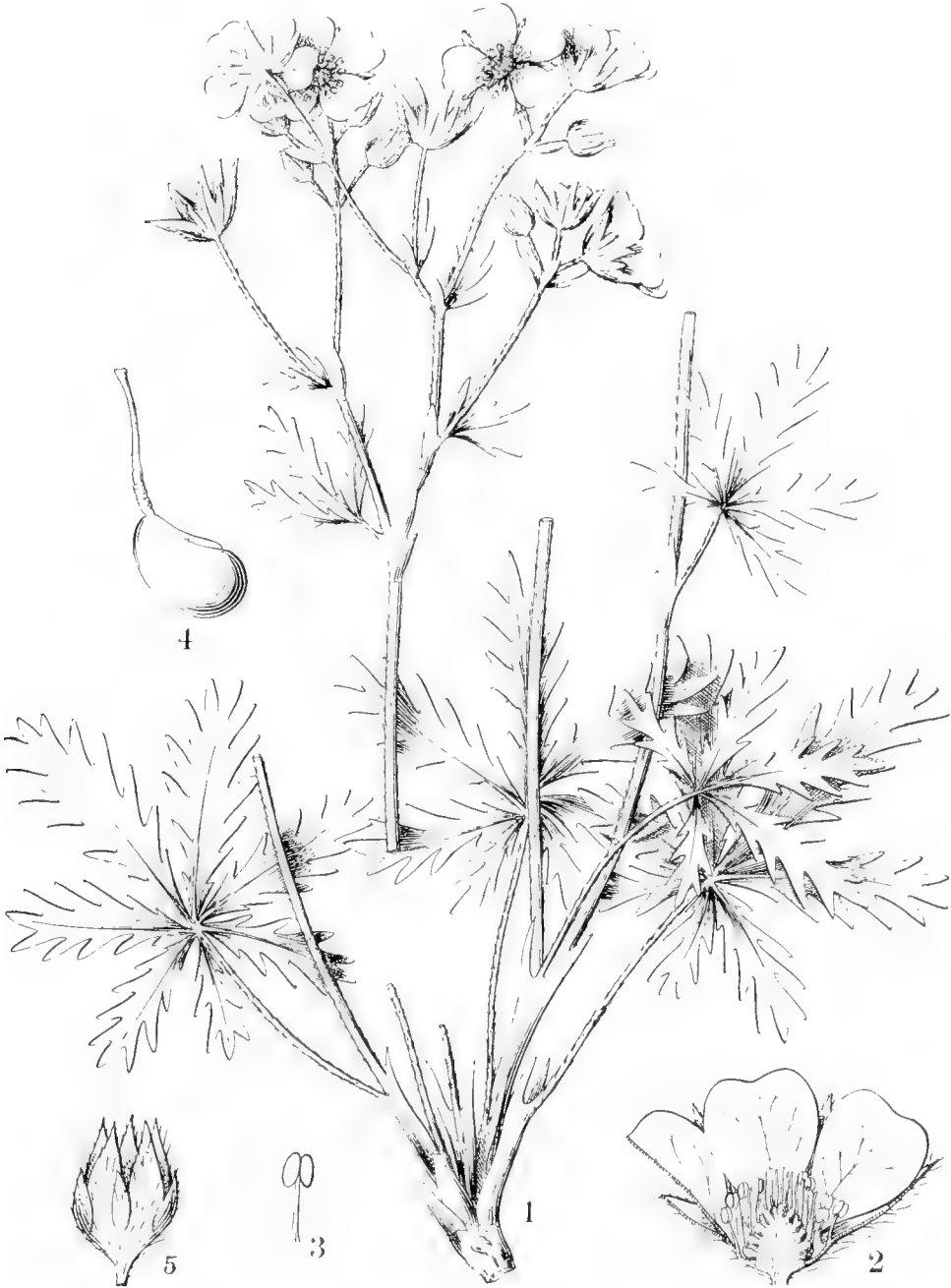
POTENTILLA CANDIDA



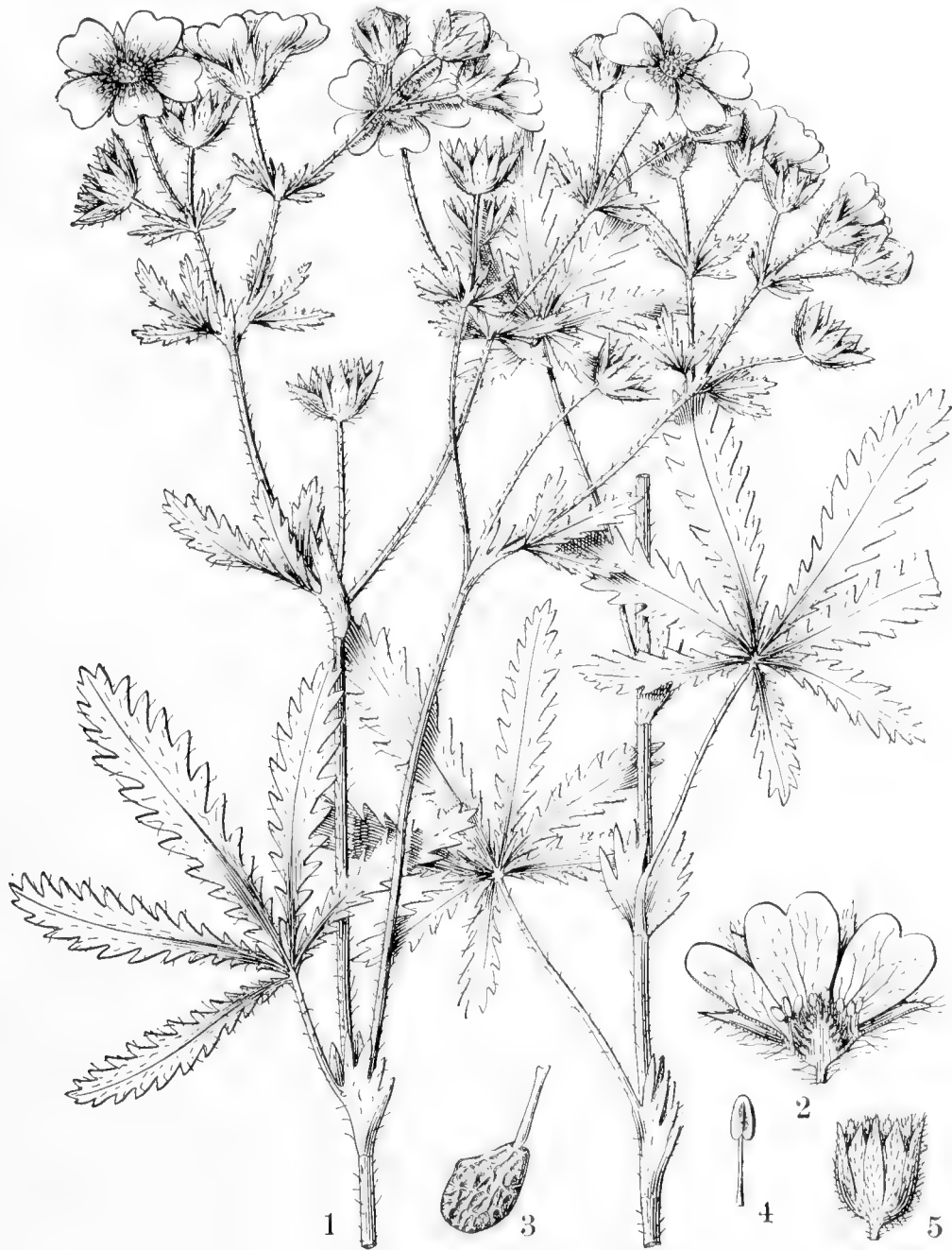
POTENTILLA GRACILIS



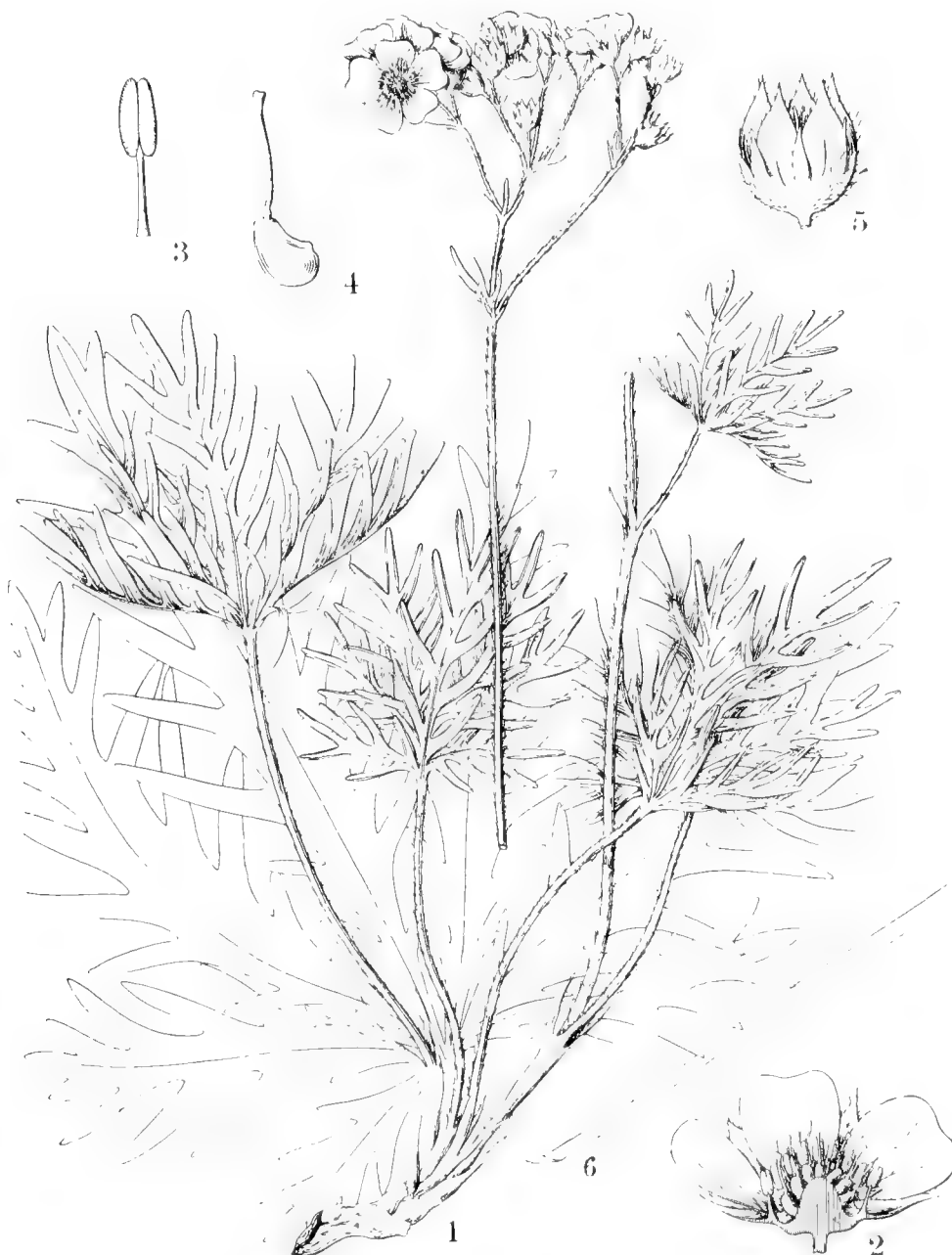
POTENTILLA BLASCHKEANA



POTENTILLA NUTTALLII



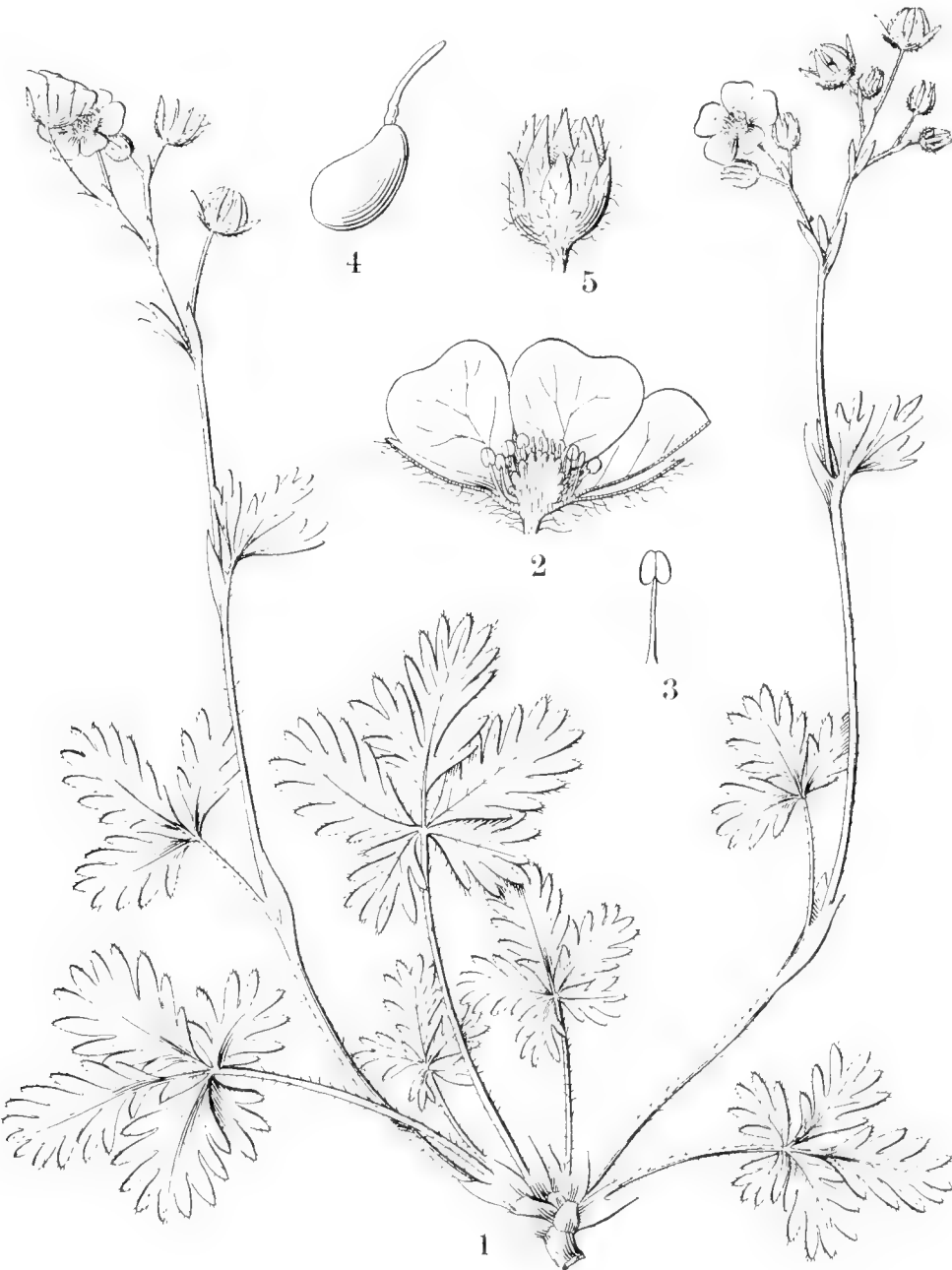
POTENTILLA SULPHUREA



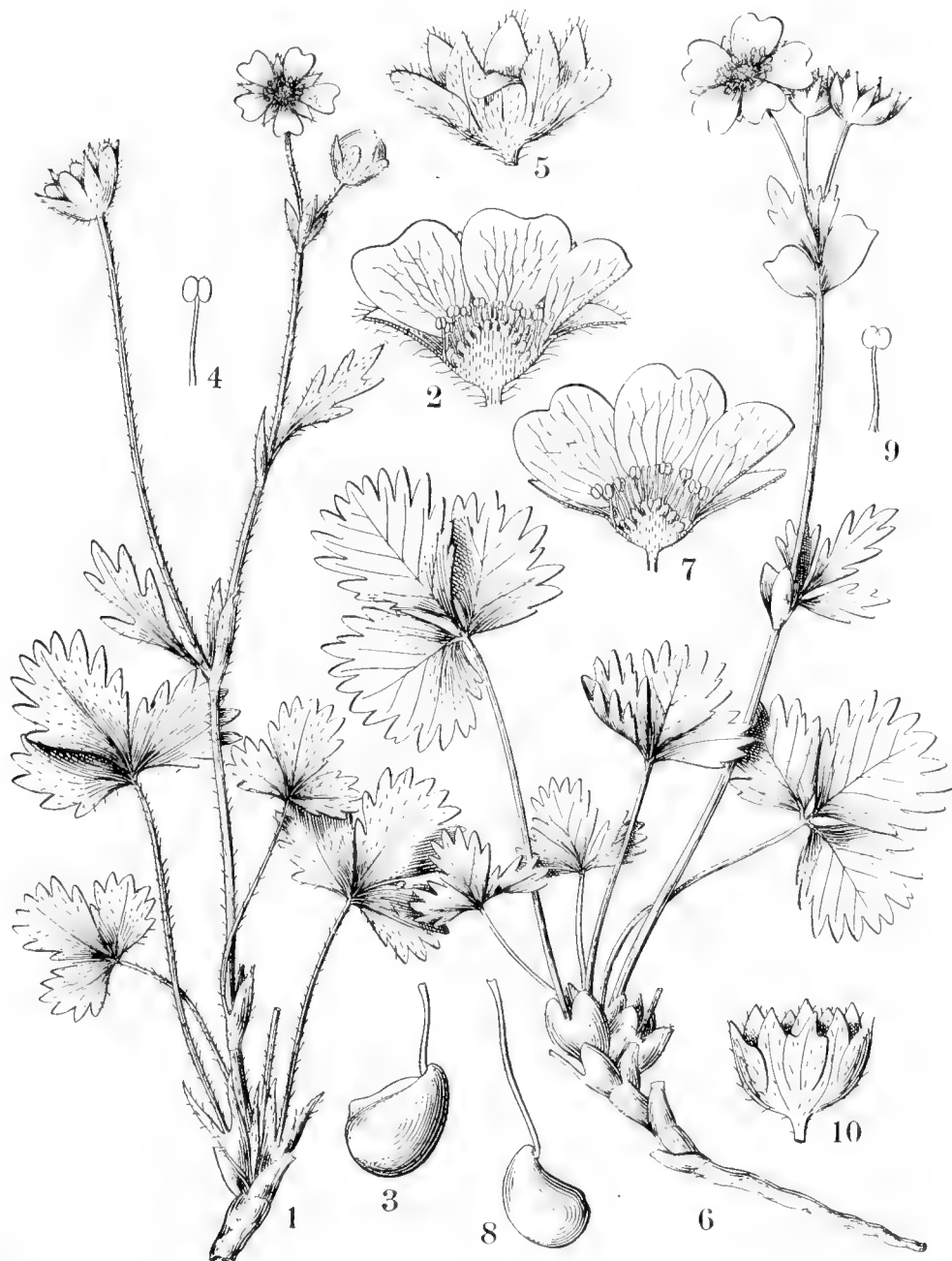
1-5 *POTENTILLA FLABELLIFORMIS* 6 VAR. *CTENOPHORA*



POTENTILLA SUBJUGA

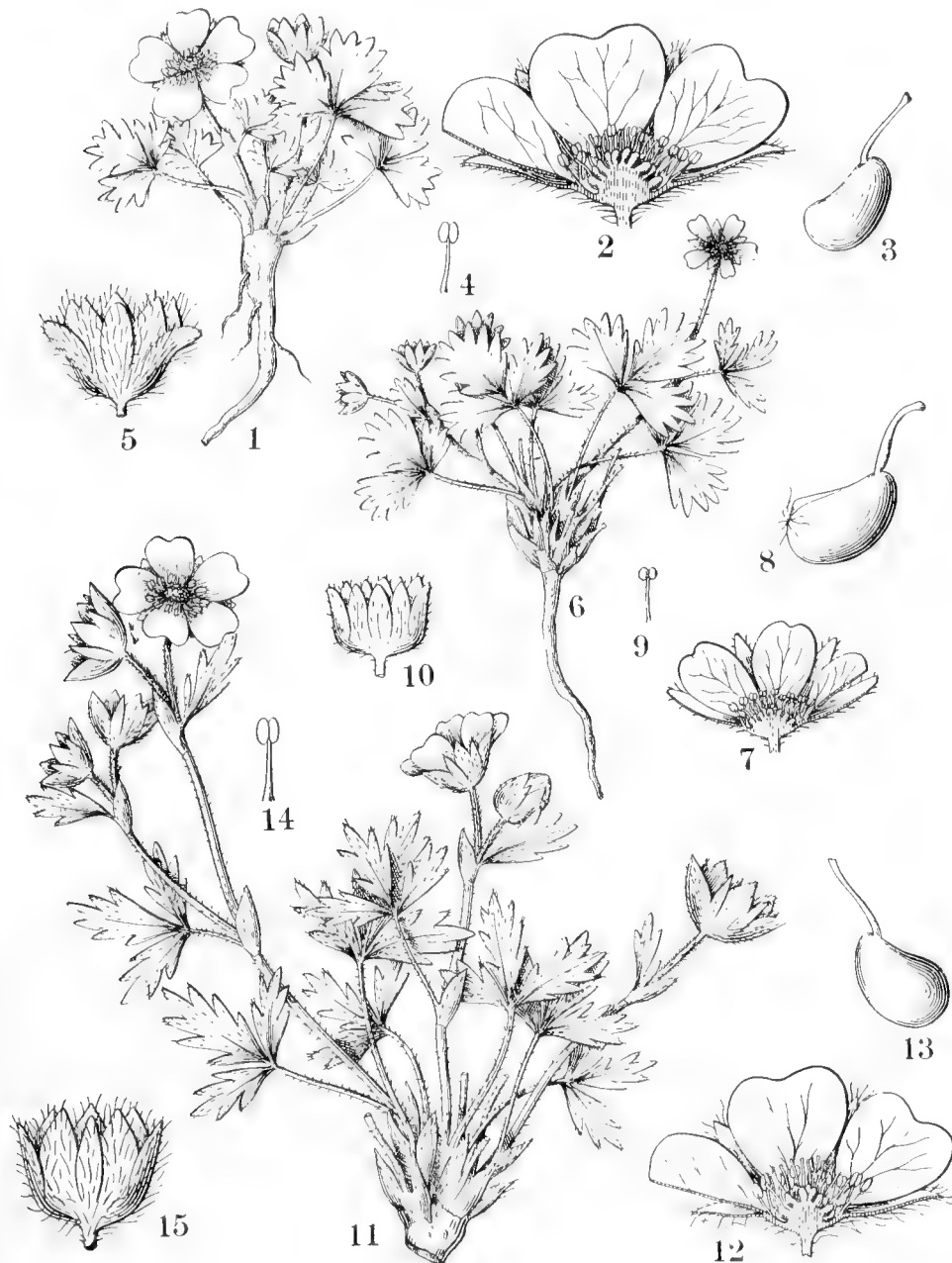


POTENTILLA QUINQUEFOLIA

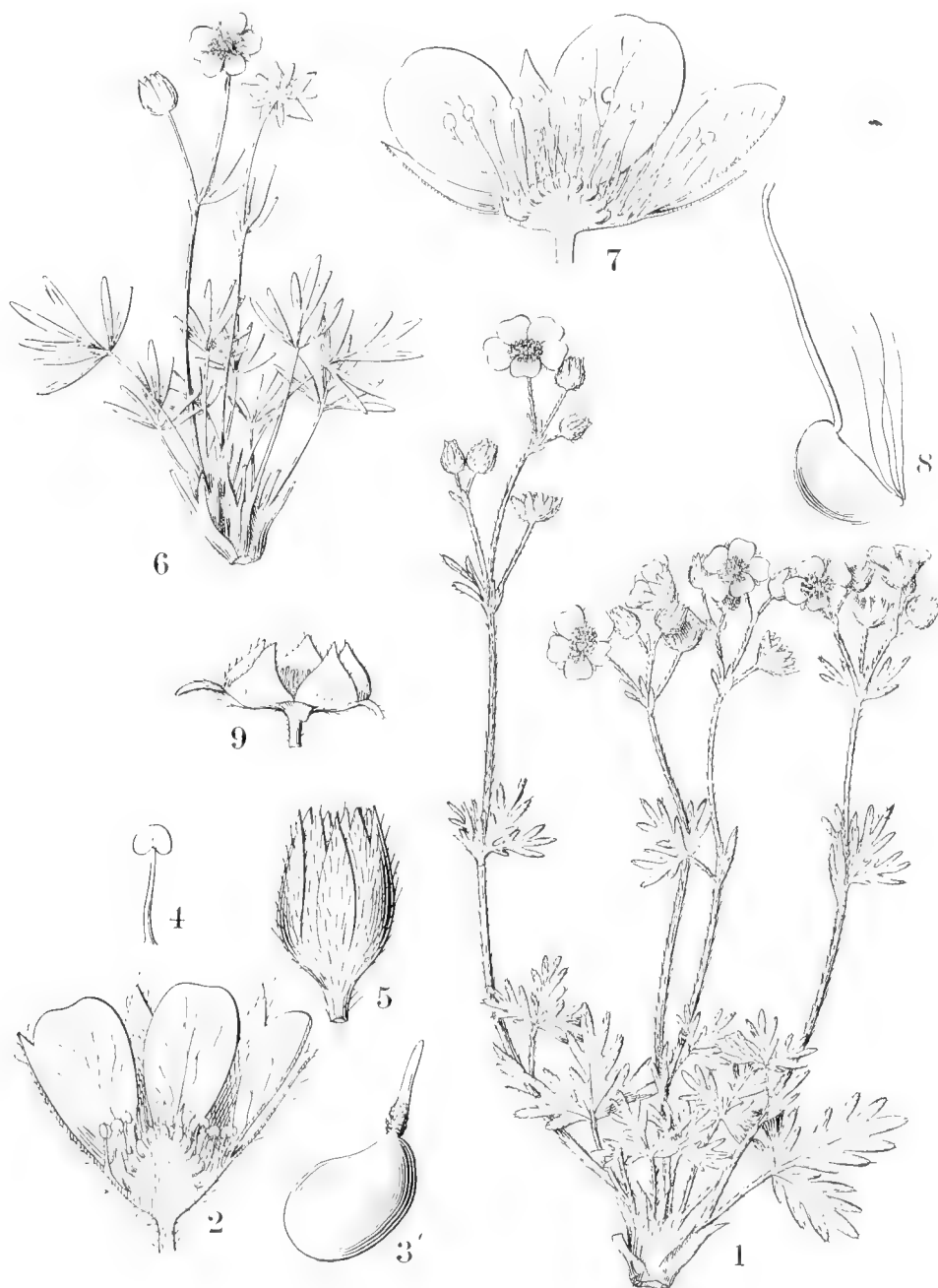


1-5 POTENTILLA FRAGIFORMIS

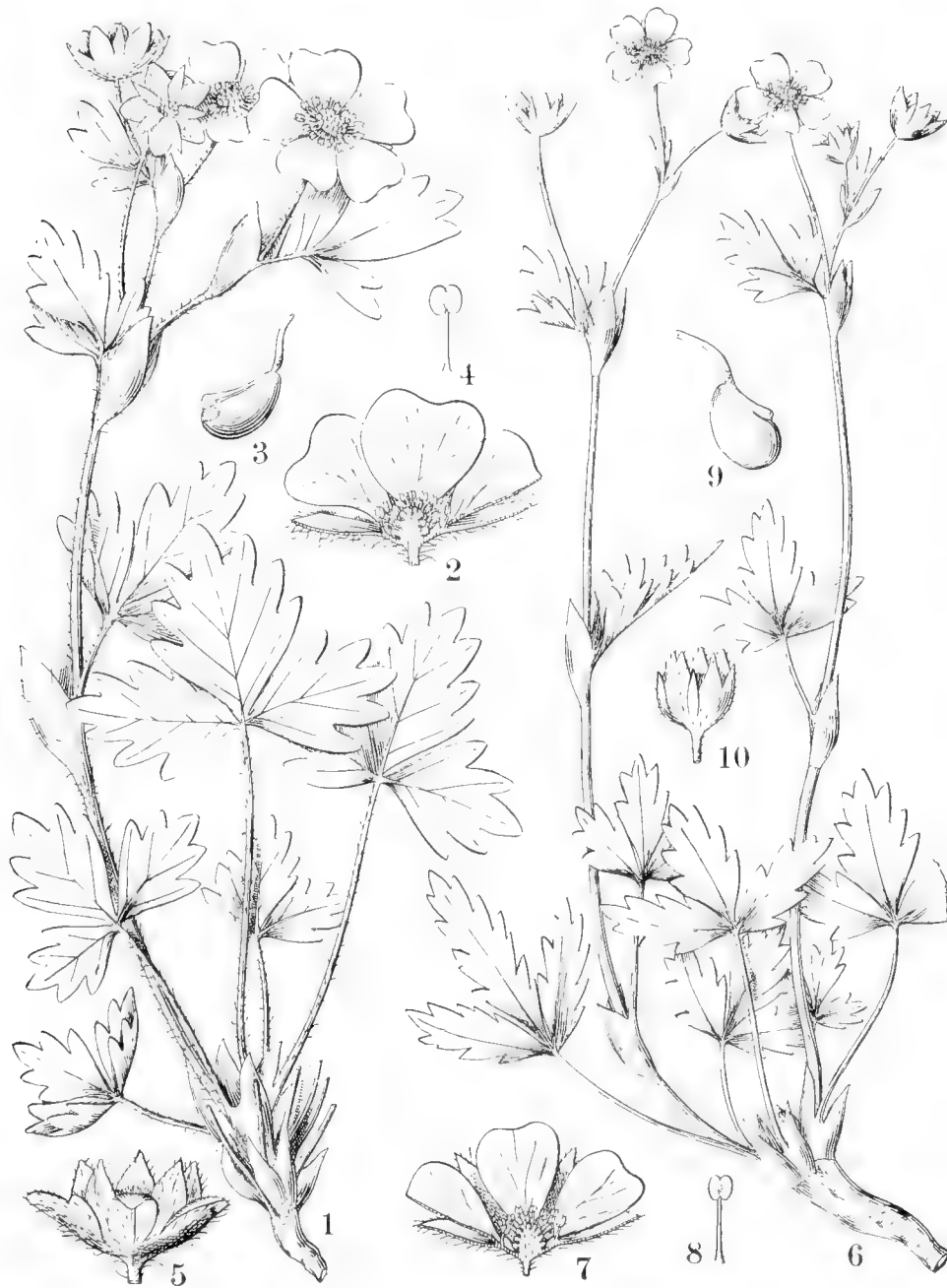
6-10 POTENTILLA FLABELLIFOLIA



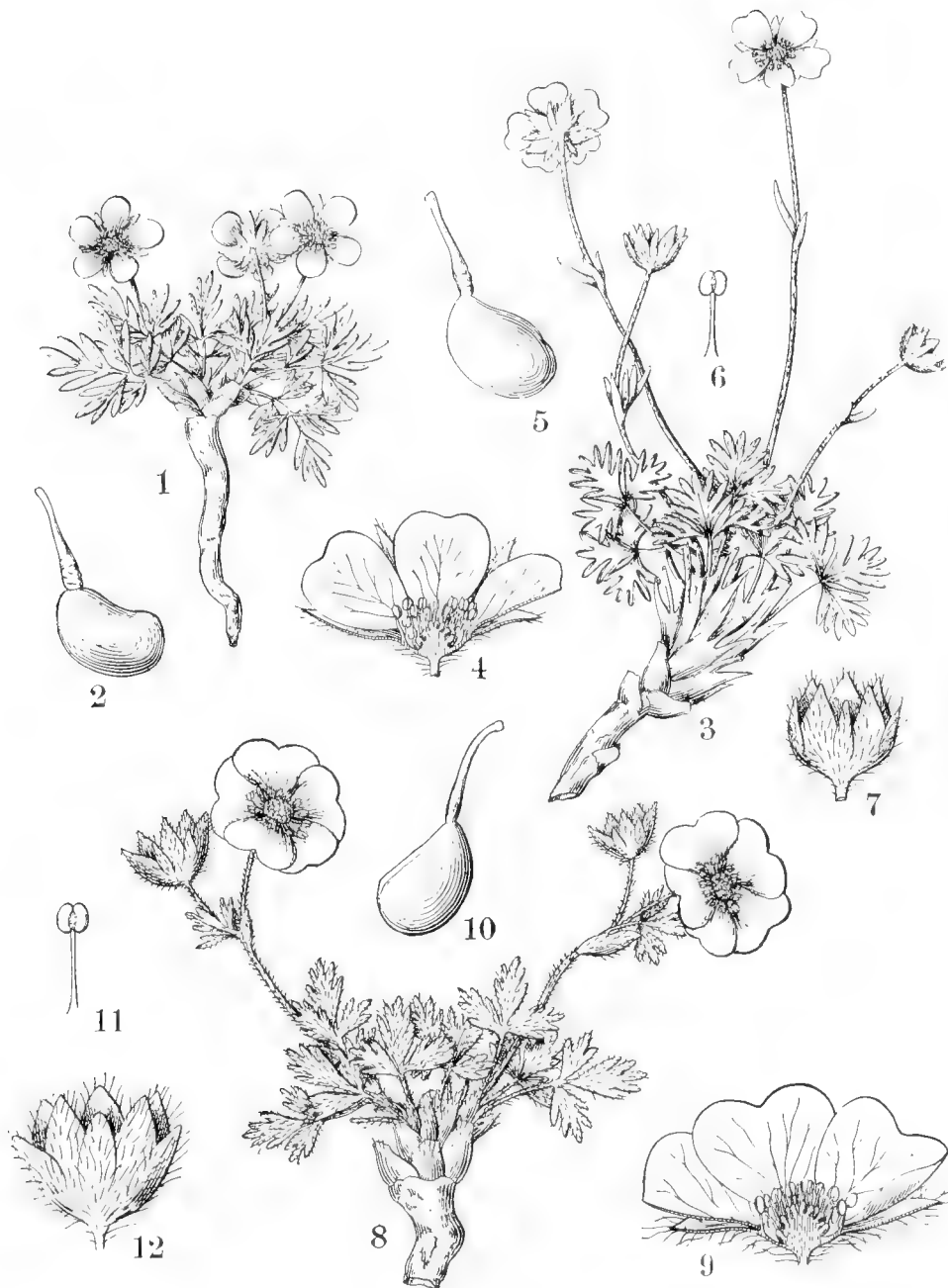
1-5 POTENTILLA NANA 6-10 POTENTILLA ROBBINSIANA
11-15 POTENTILLA EMARGINATA



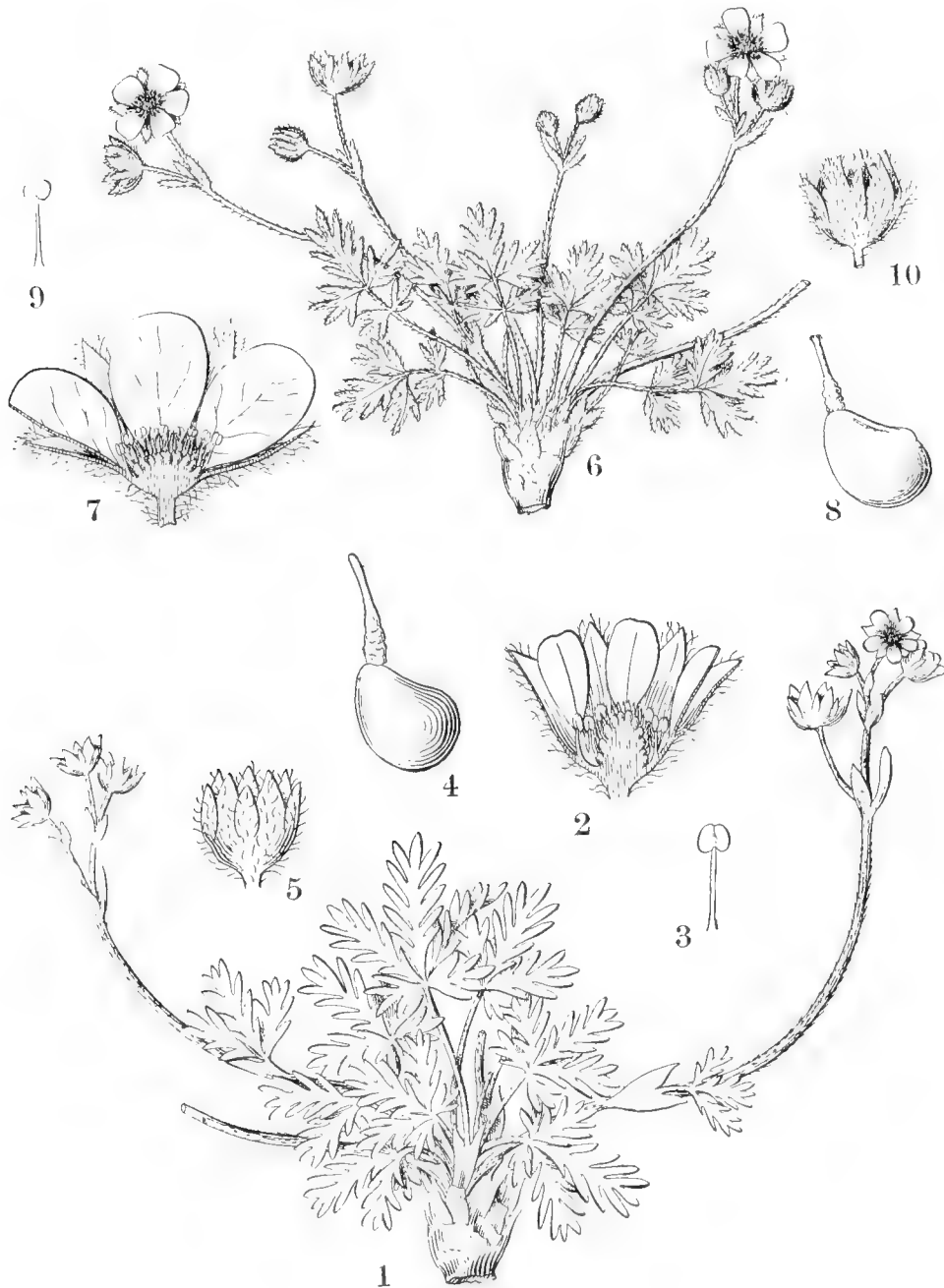
1-5 *POTENTILLA HOOKERIANA* 6-9 *POTENTILLA BIFLORA*



1-5 POTENTILLA VILLOSA 6-10 POTENTILLA NIVEA



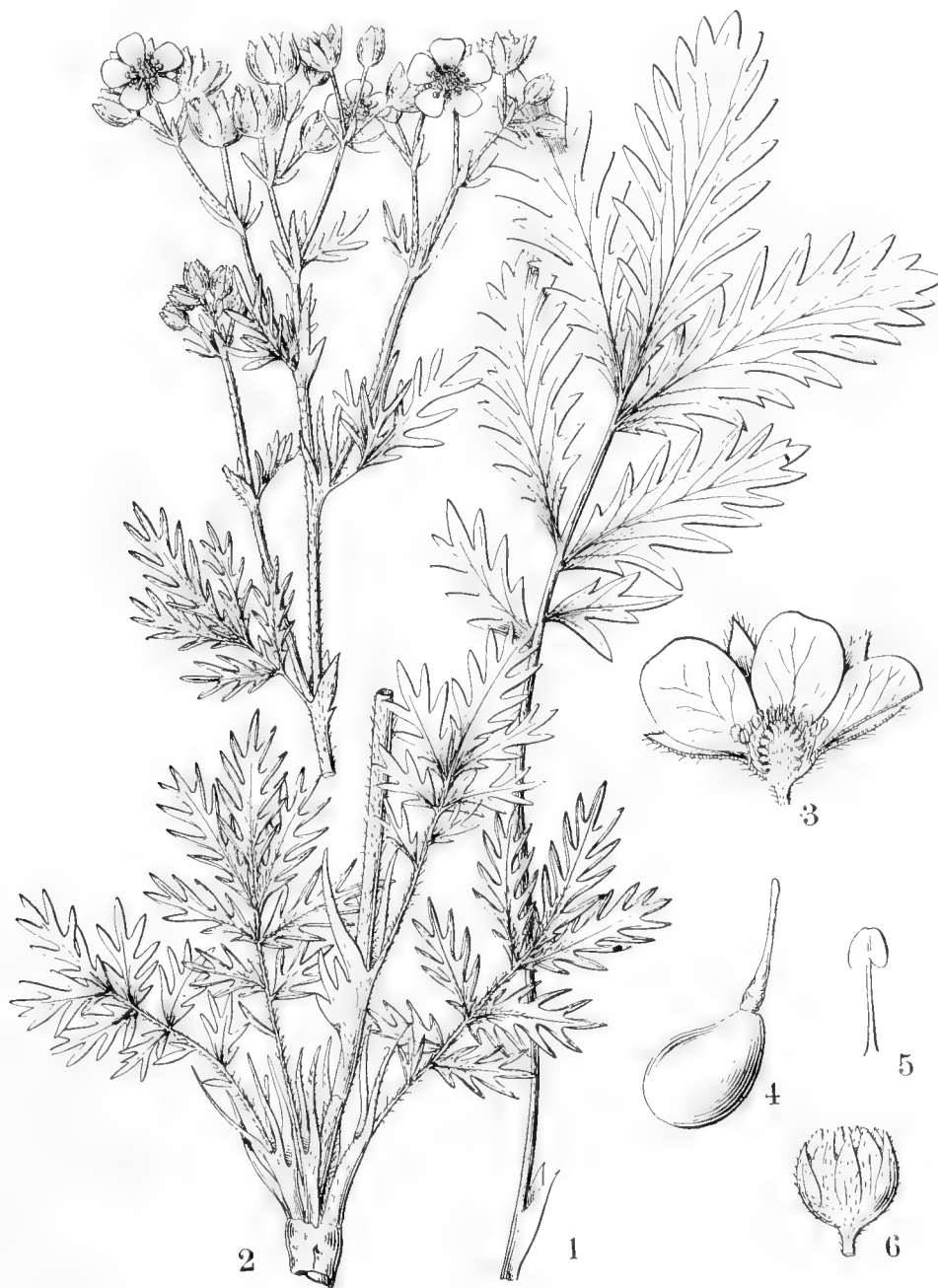
1-2 POTENTILLA SOMMERFELTII 3-7 POTENTILLA UNIFLORA
8-12 POTENTILLA VAHLIANA



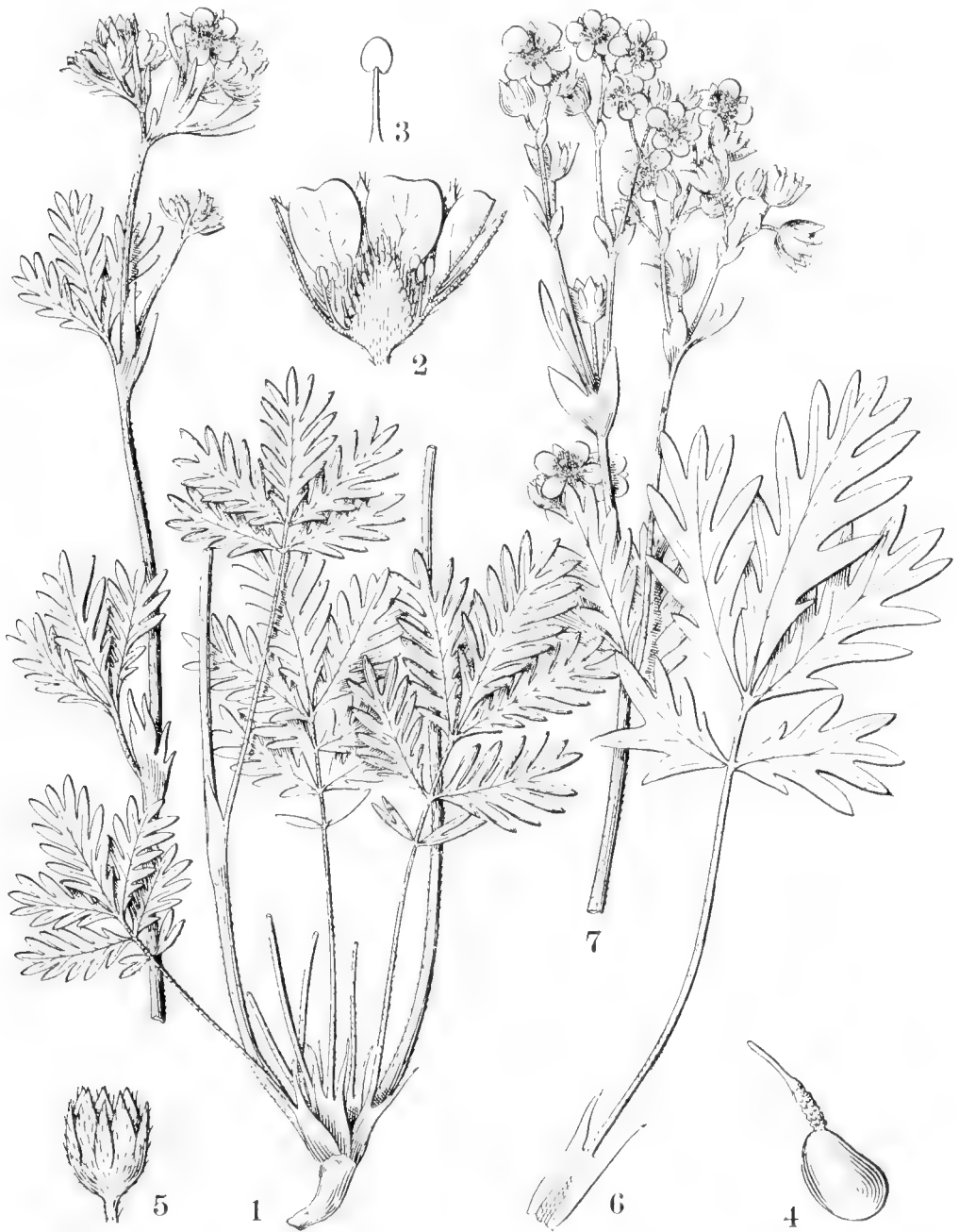
1-5 *POTENTILLA PSEUDOSERICEA* 6-10 *POTENTILLA PULCHELLA*



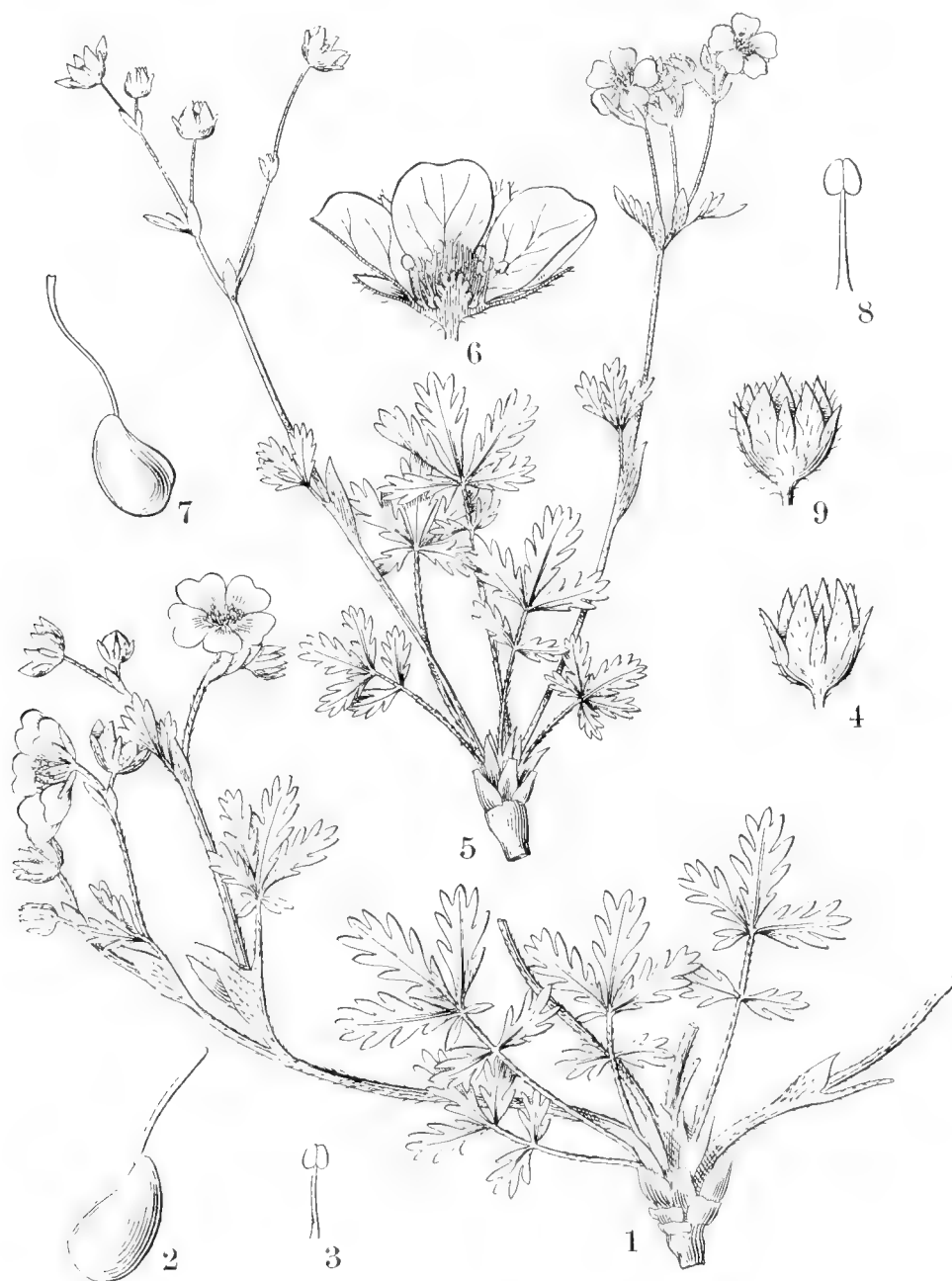
1-5 *POTENTILLA LITORALIS* 6-10 *POTENTILLA MULTIFIDA*



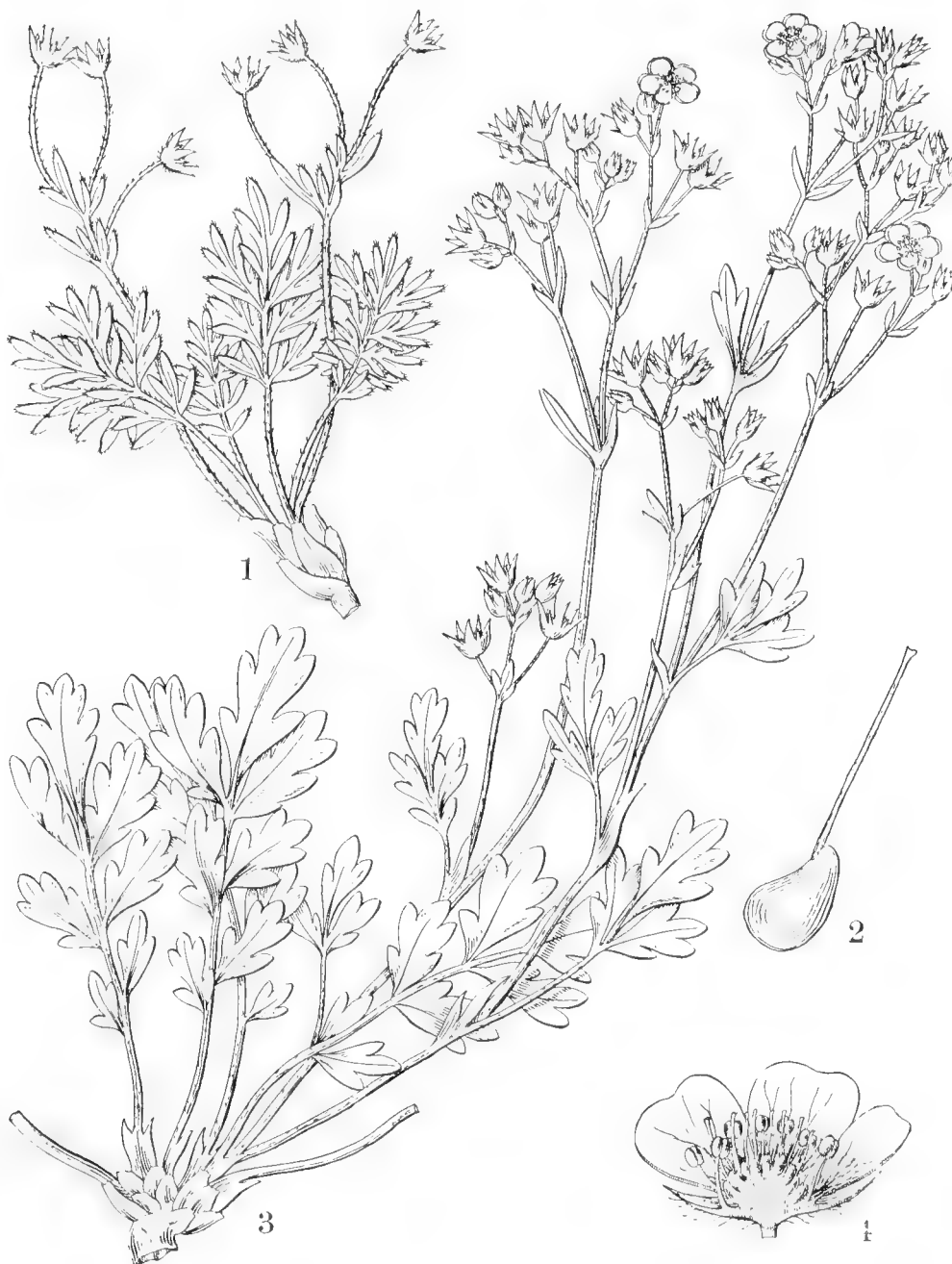
POTENTILLA PENNSYLVANICA



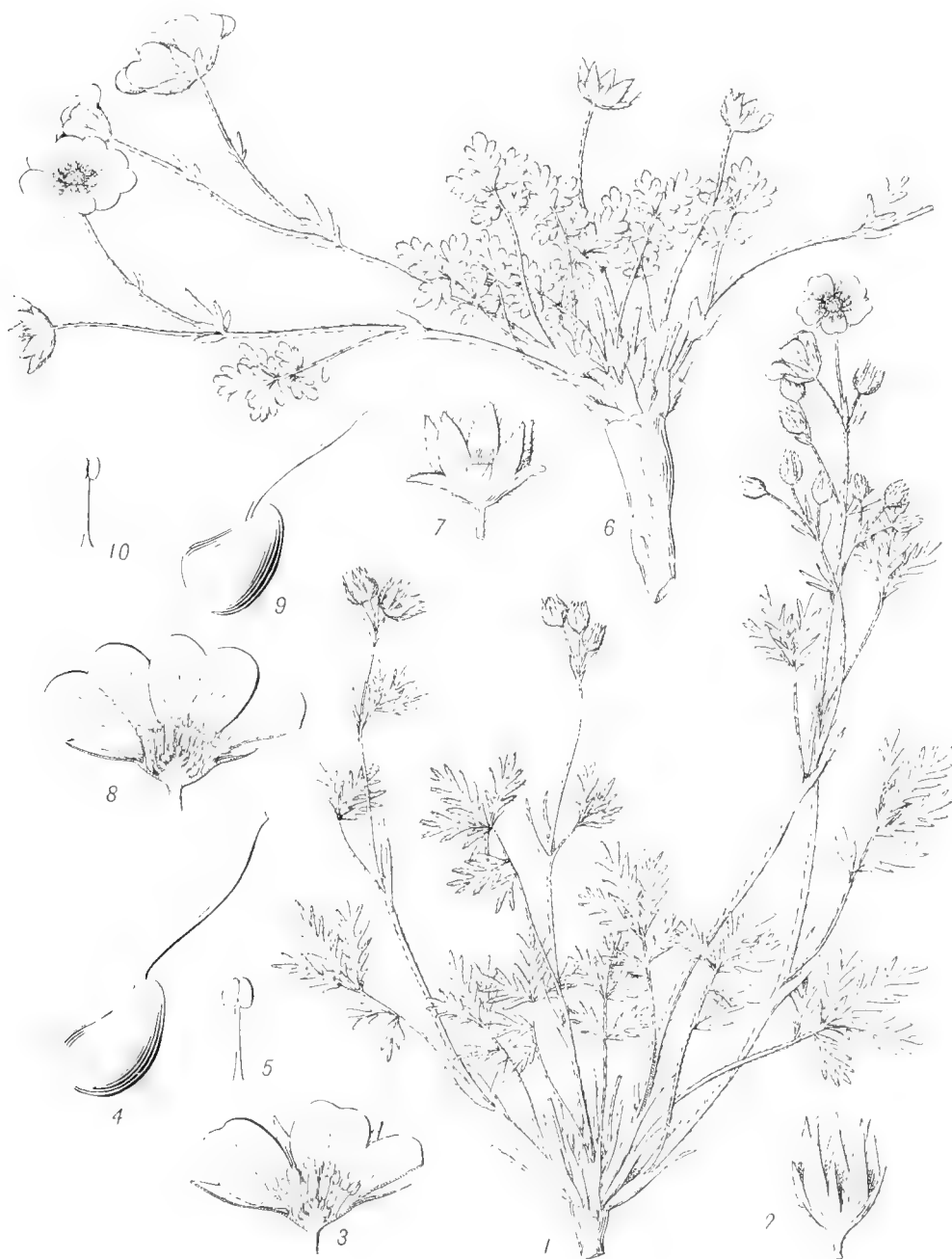
POTENTILLA BIPINNATIFIDA



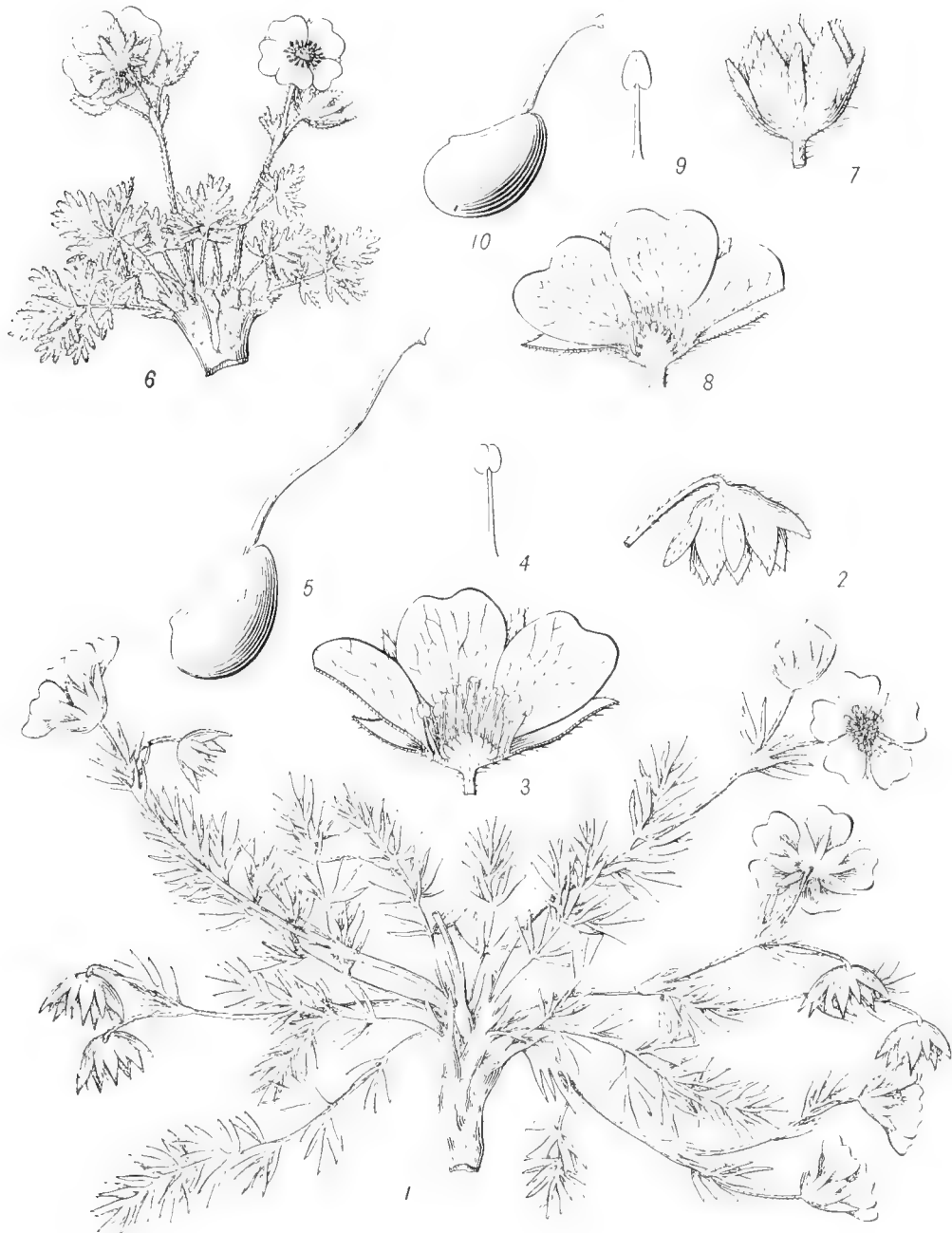
1-4 *POTENTILLA RUBRICAULIS* 5-9 *POTENTILLA FILICAULIS*



1-2 POTENTILLA MACOUNII 3-4 POTENTILLA EFFUSA



1-5 POTENTILLA TENERRIMA 6-10 POTENTILLA MINUTIFOLIA



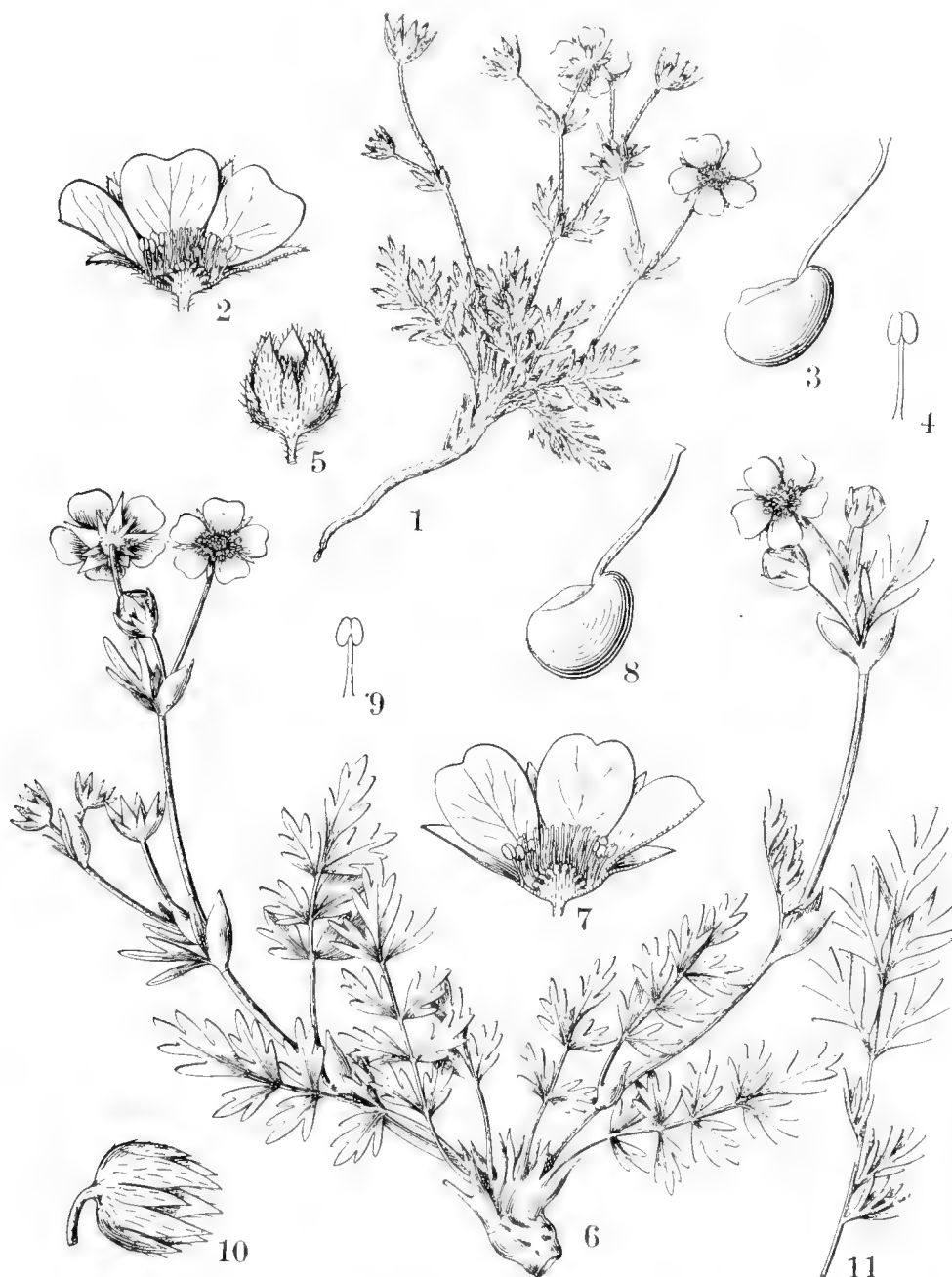
1-5 *POTENTILLA MILLEFOLIA* 6-10 *POTENTILLA SAXIMONTANA*



1-5 POTENTILLA BREVIFOLIA 6-10 POTENTILLA GRAYI

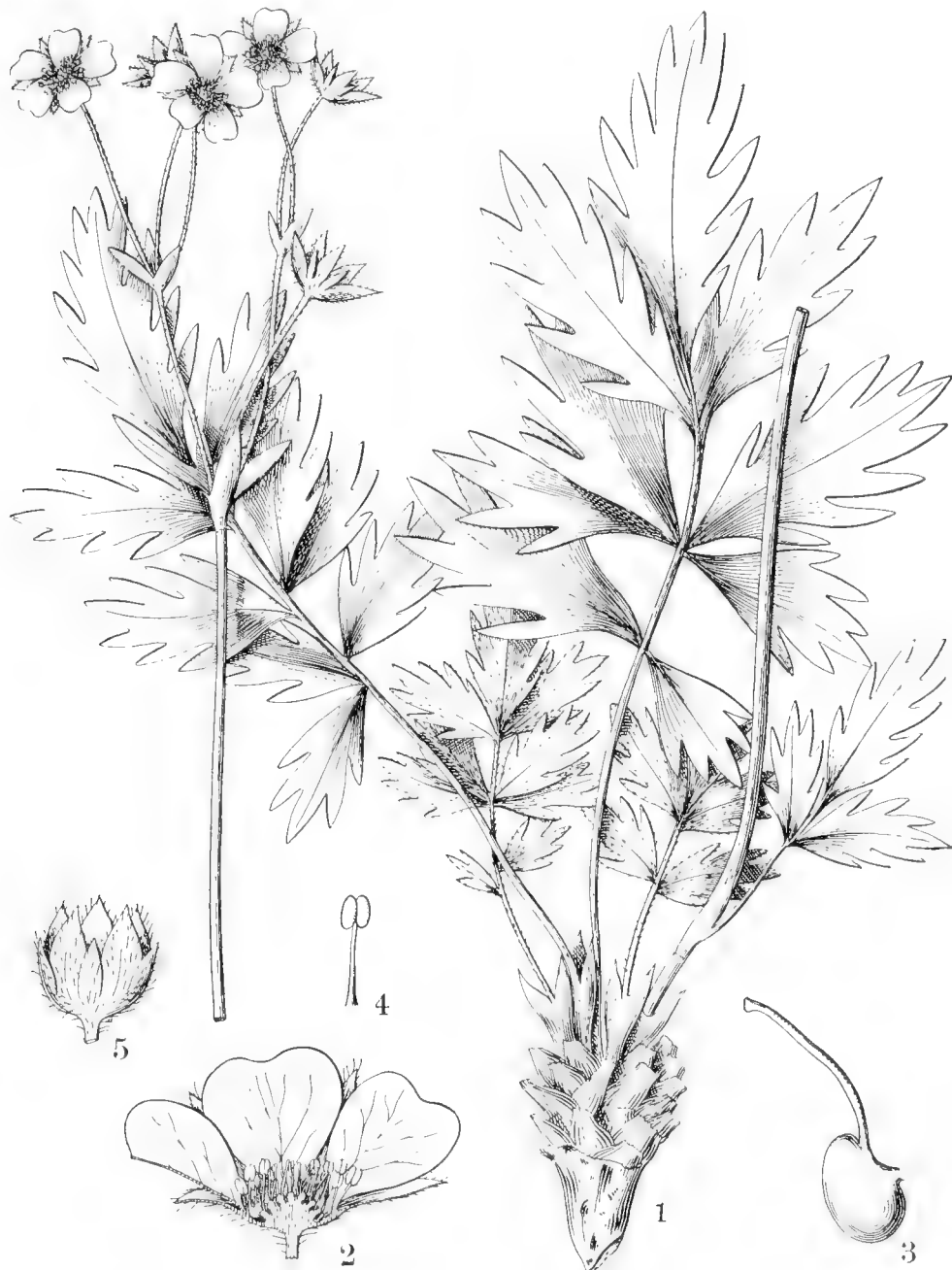


1 POTENTILLA NEWBERRYI ARENICOLA 2-5 POTENTILLA ARIZONICA



1-5 POTENTILLA PINNATISECTA

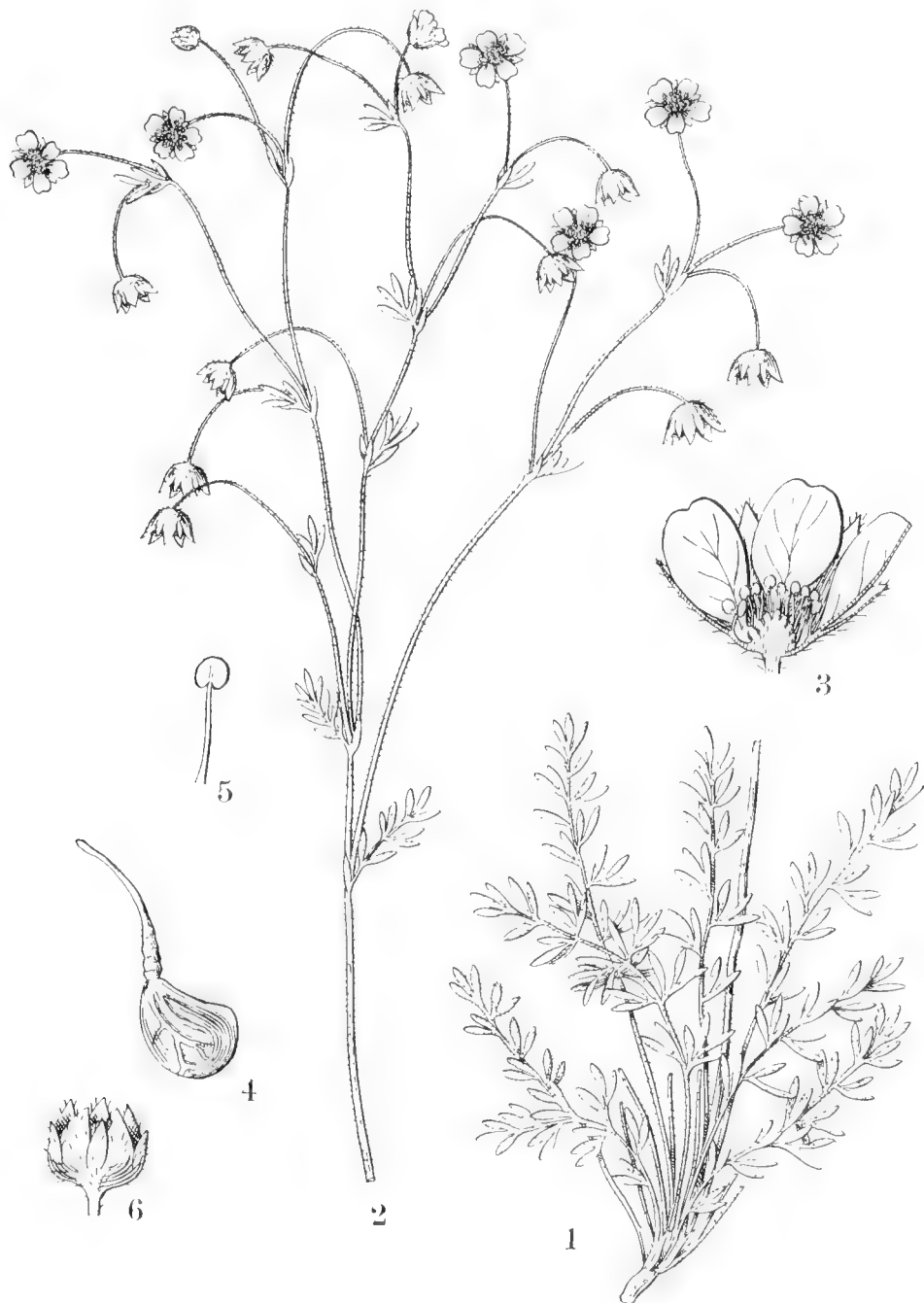
6-10 POTENTILLA PLATTENSIS



POTENTILLA DRUMMONDII



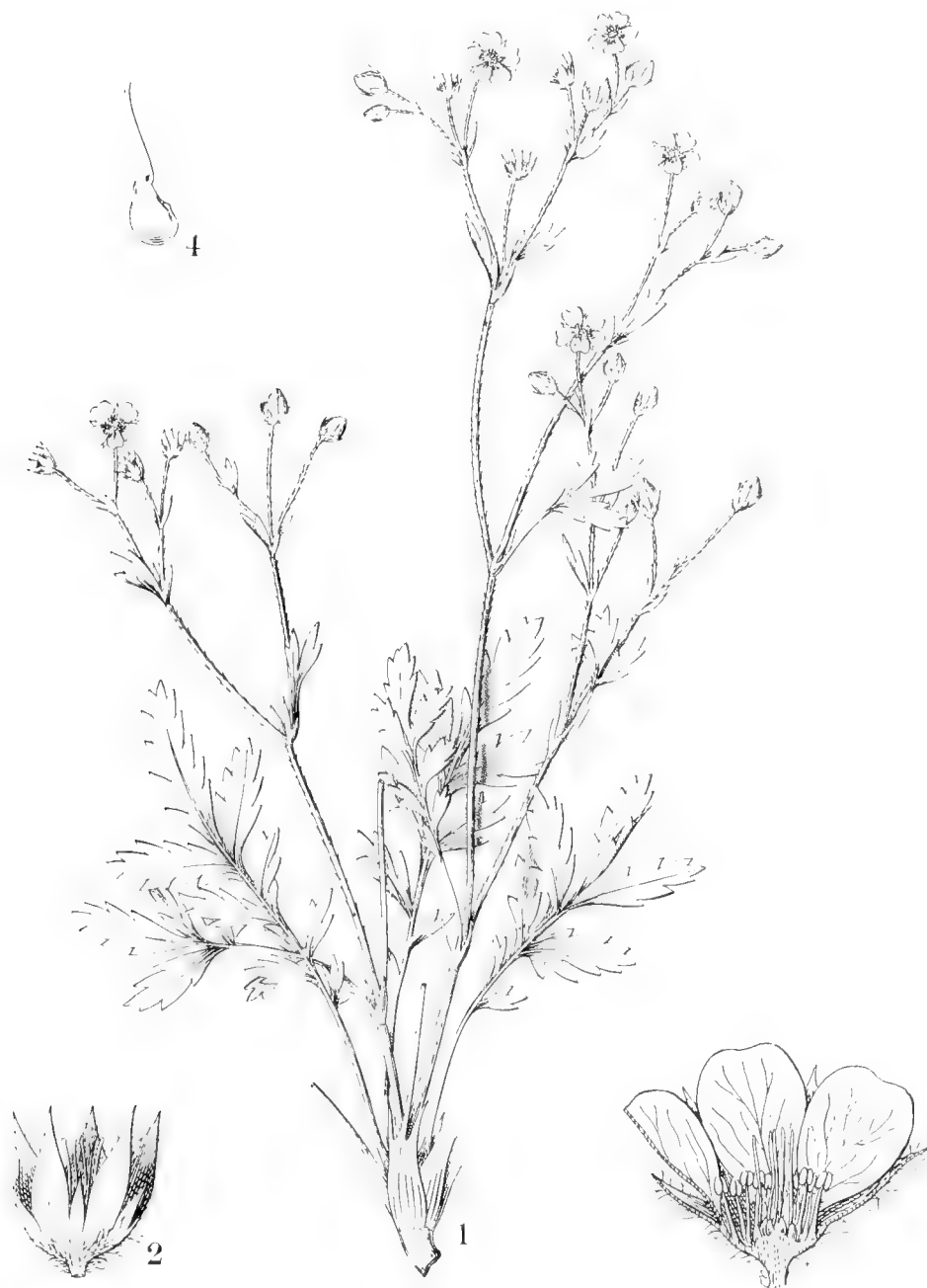
POTENTILLA MULTIJUGA



POTENTILLA NEWBERRYI



POTENTILLA HIPPIANA



POTENTILLA COLORADENSIS



POTENTILLA BREWERI EXPANSA



POTENTILLA AMBIGENS



POTENTILLA CRINITA



POTENTILLA LEMMONII



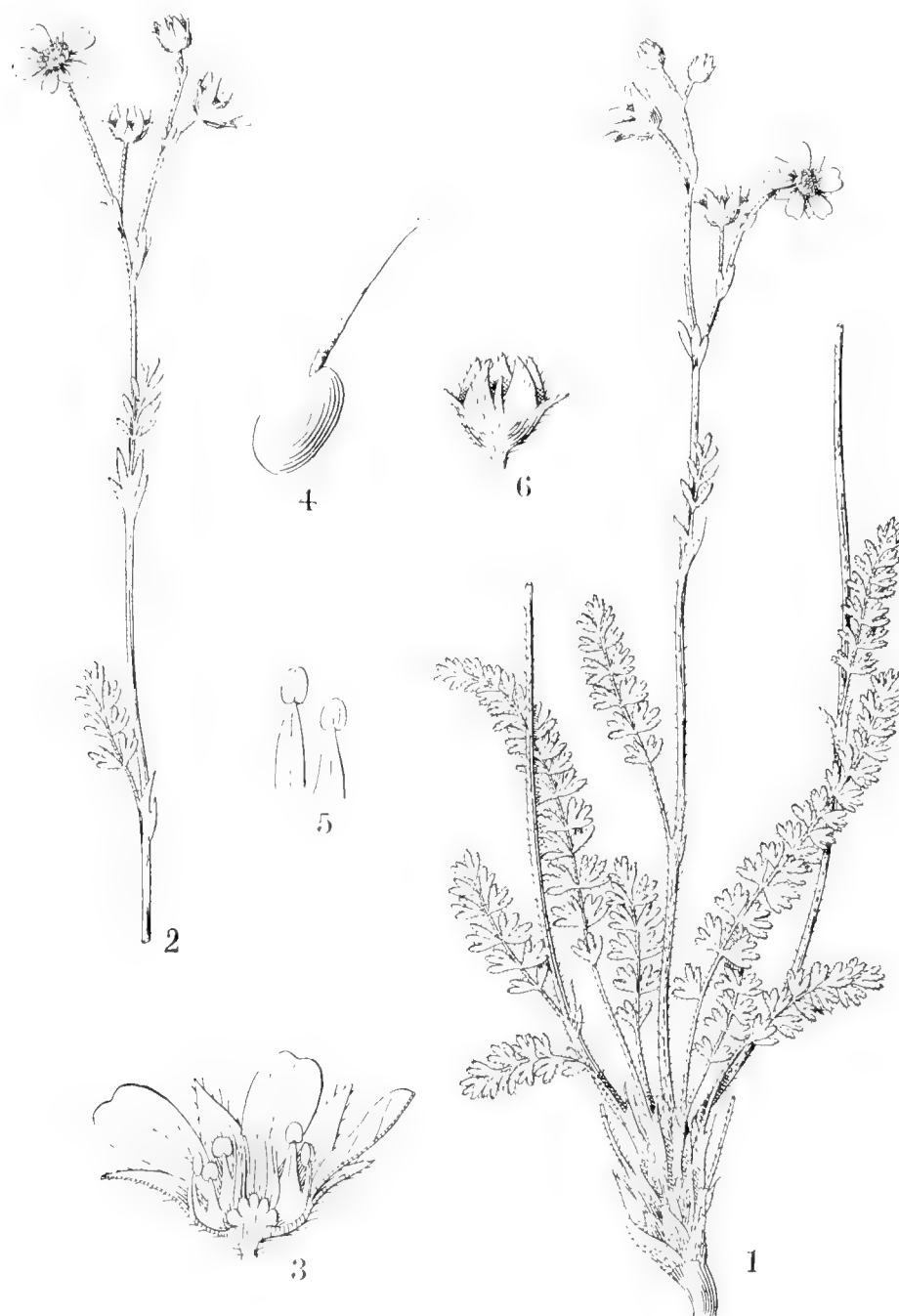
HORKELIA FRONDOSA



HORKELIA CALIFORNICA



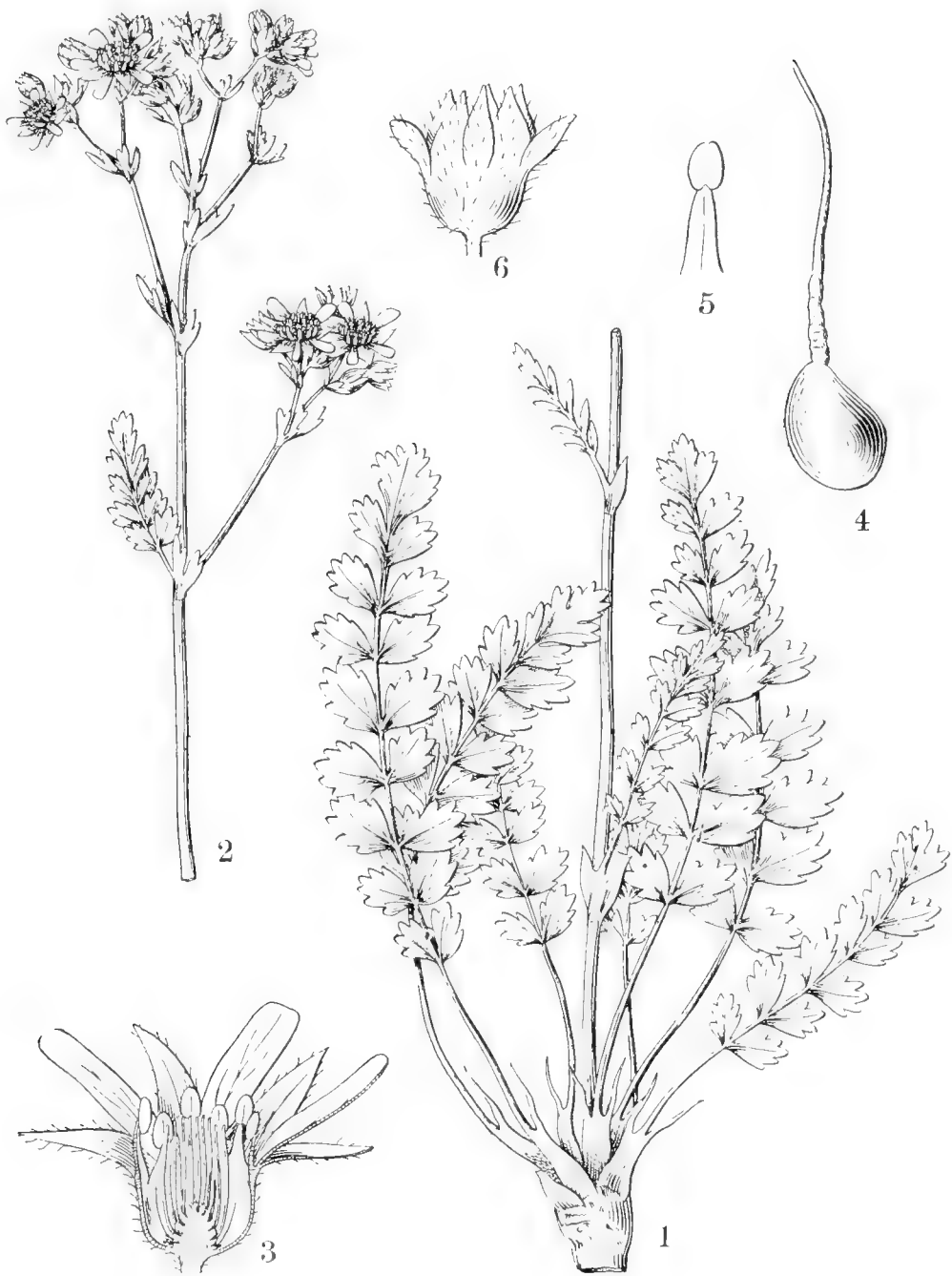
HORKELIA ELATA



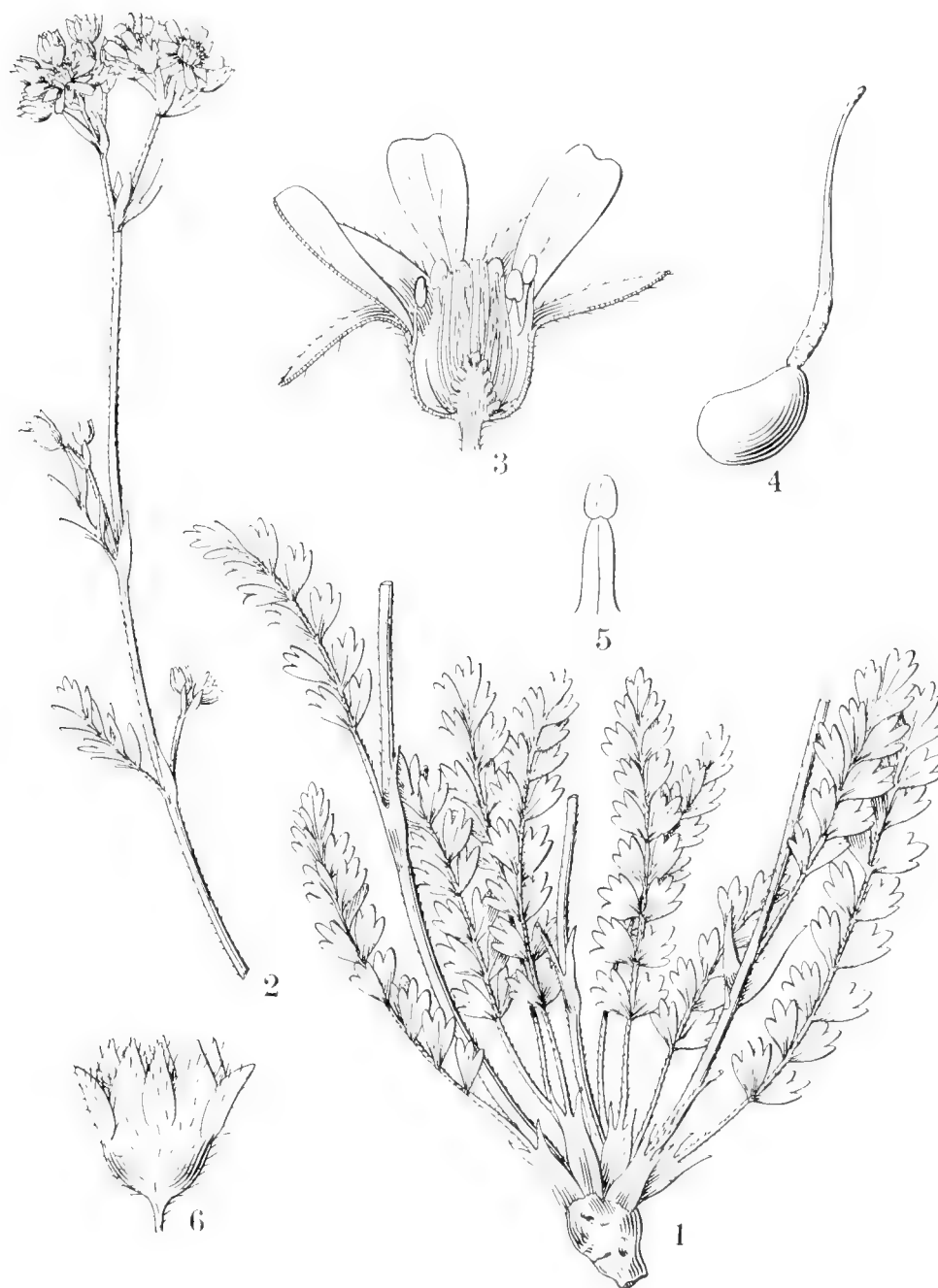
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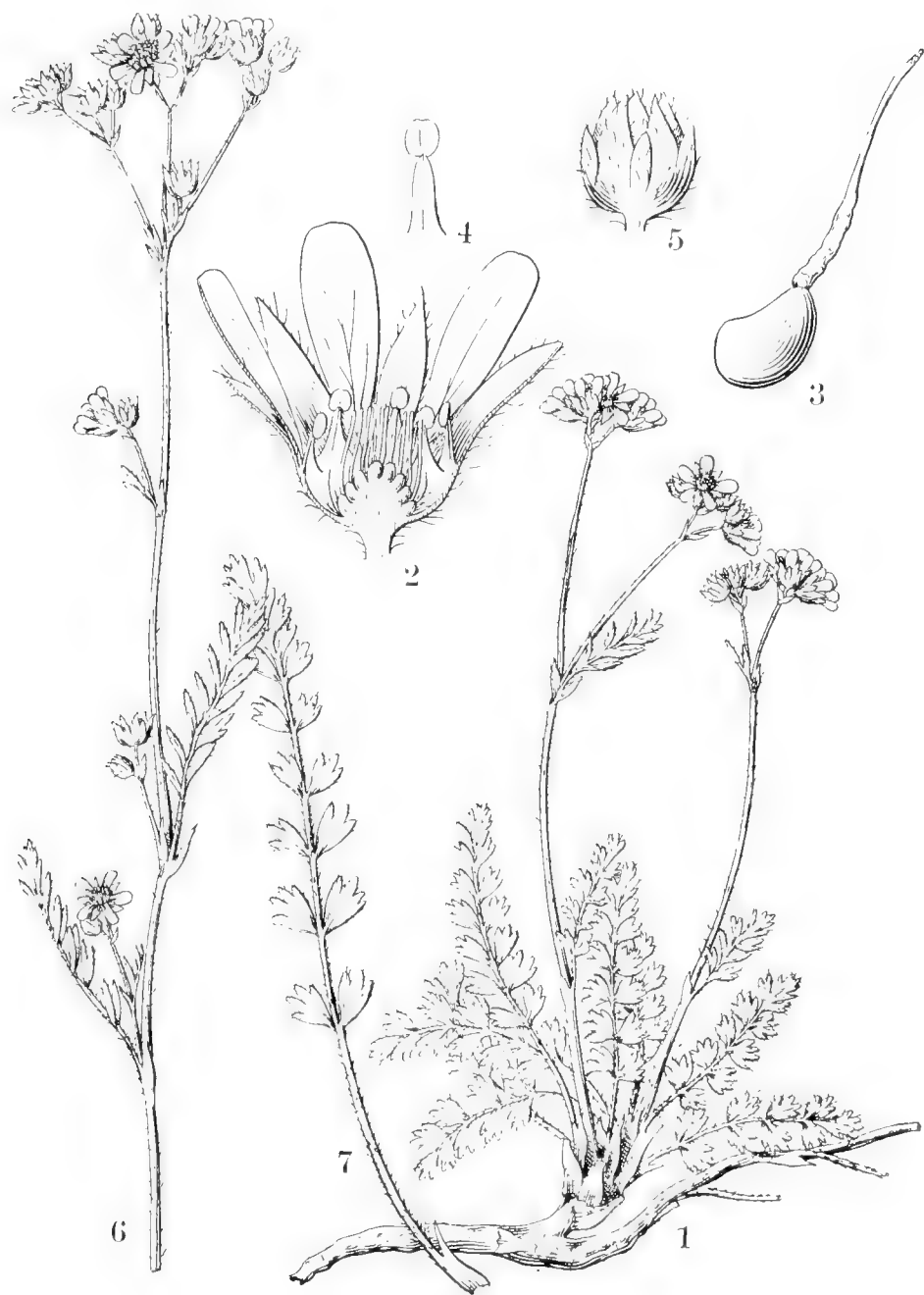
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HORKELIA CLEVELANDII



HORKELIA PARRYI



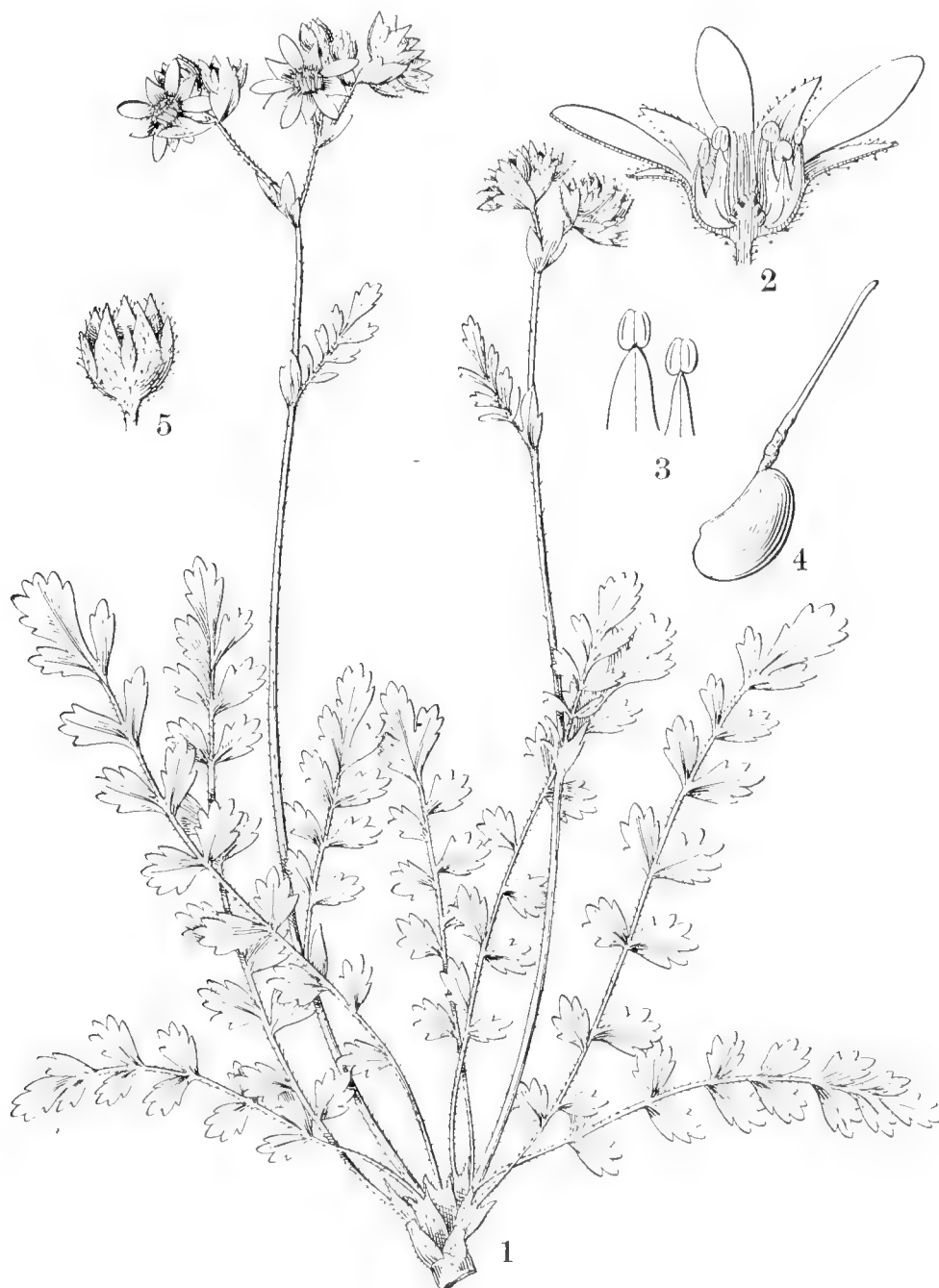
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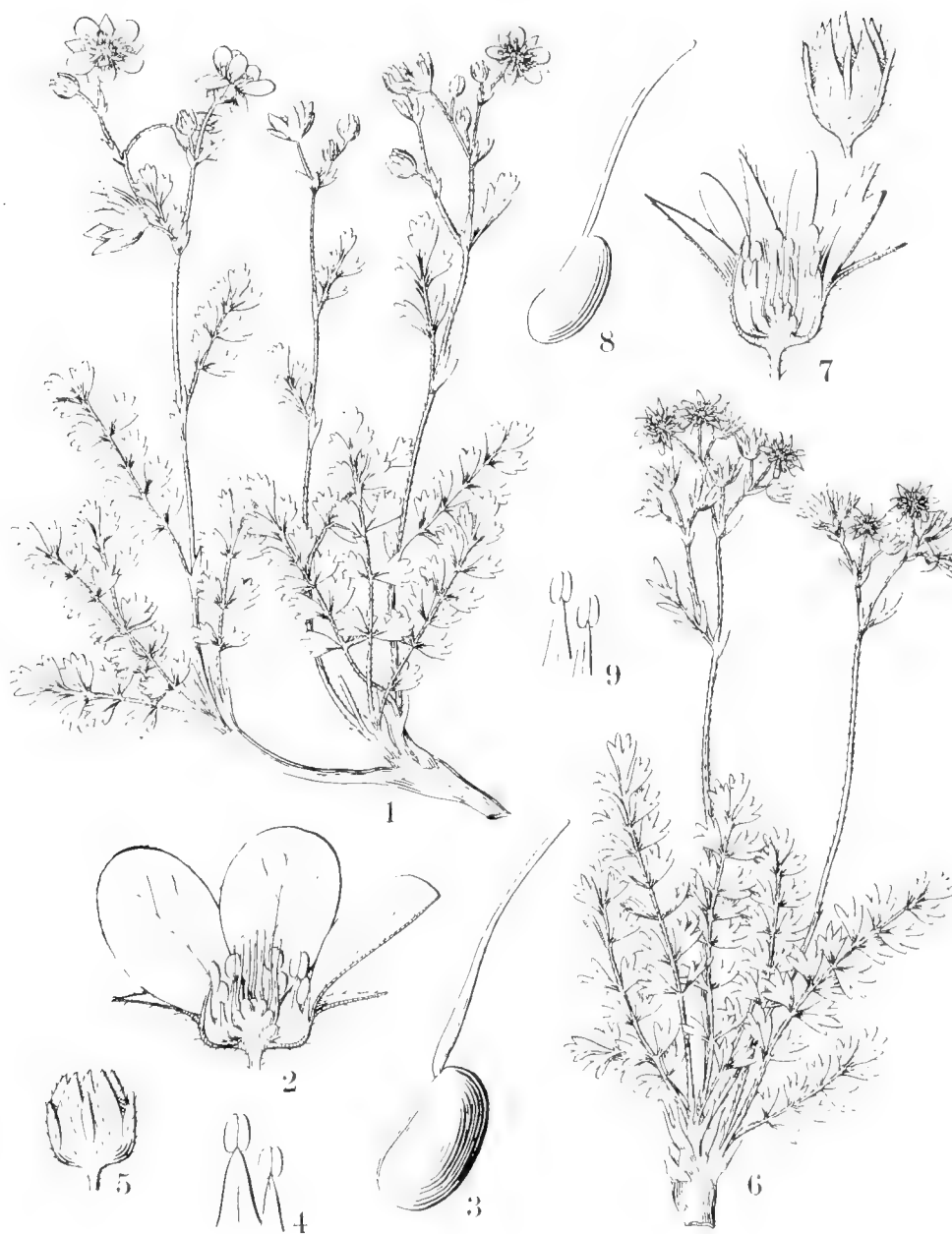
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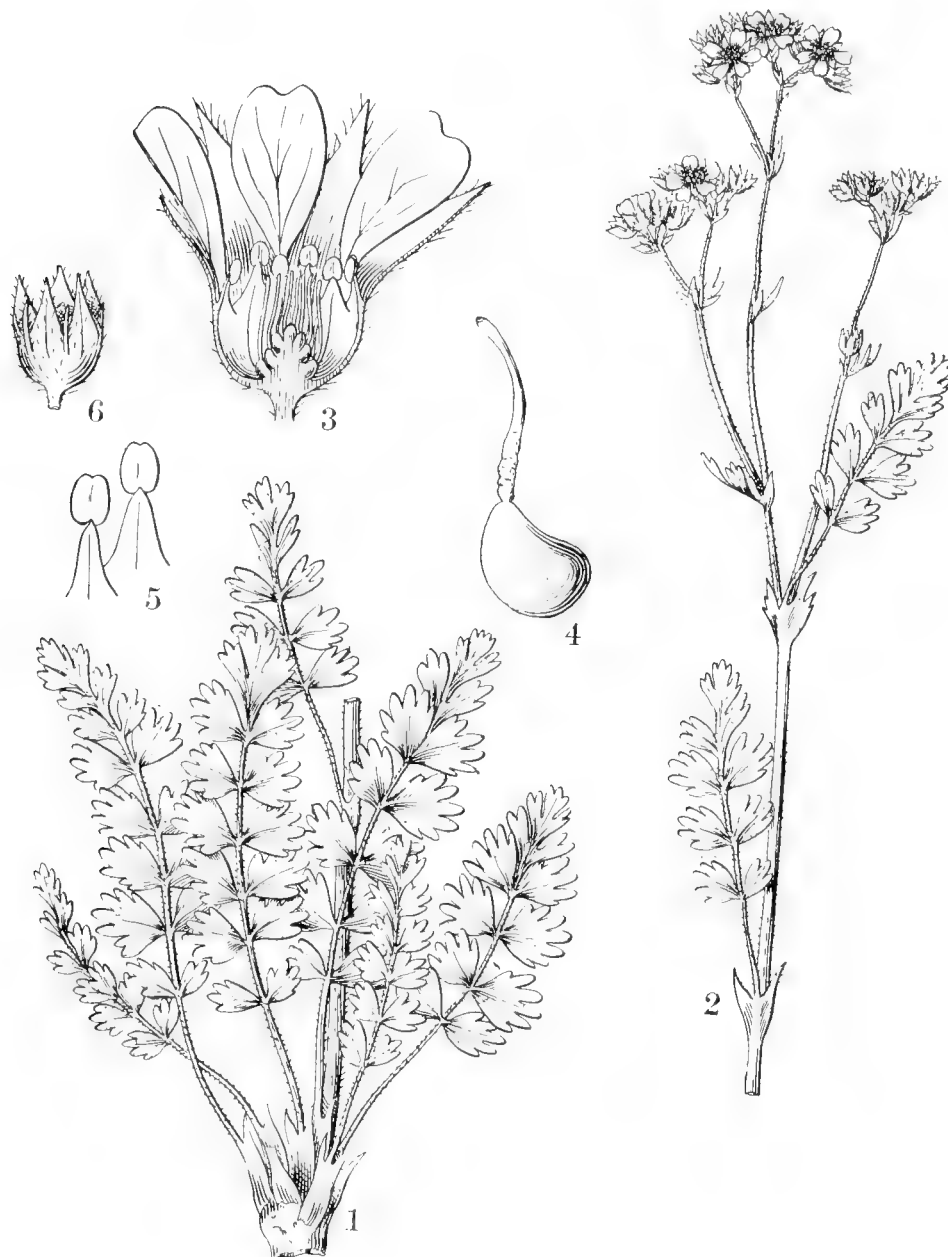
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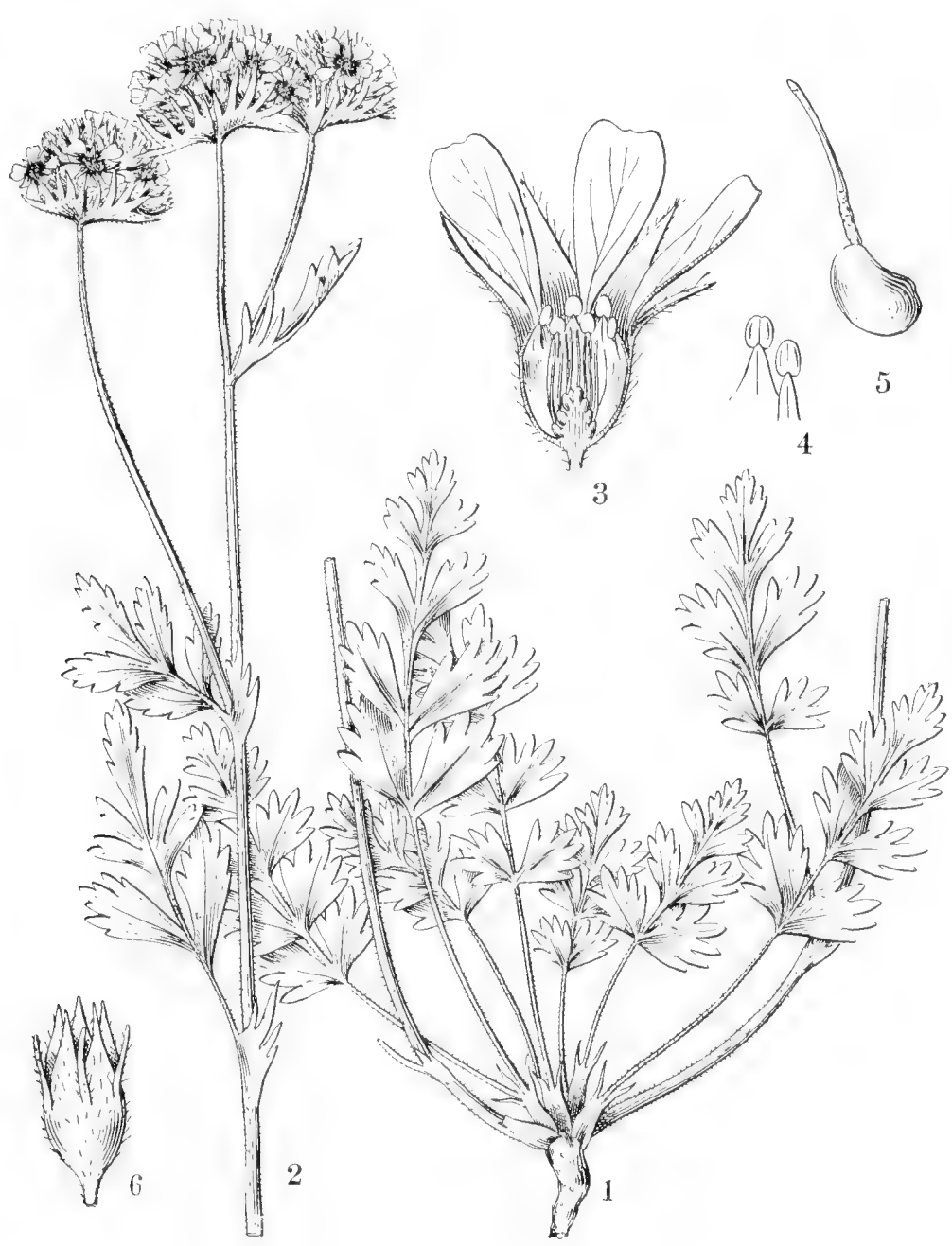
HORKELIA CUNEATA



1-5 HORKELIA PLATYPETALA 6-10 HORKELIA HENDERSONII



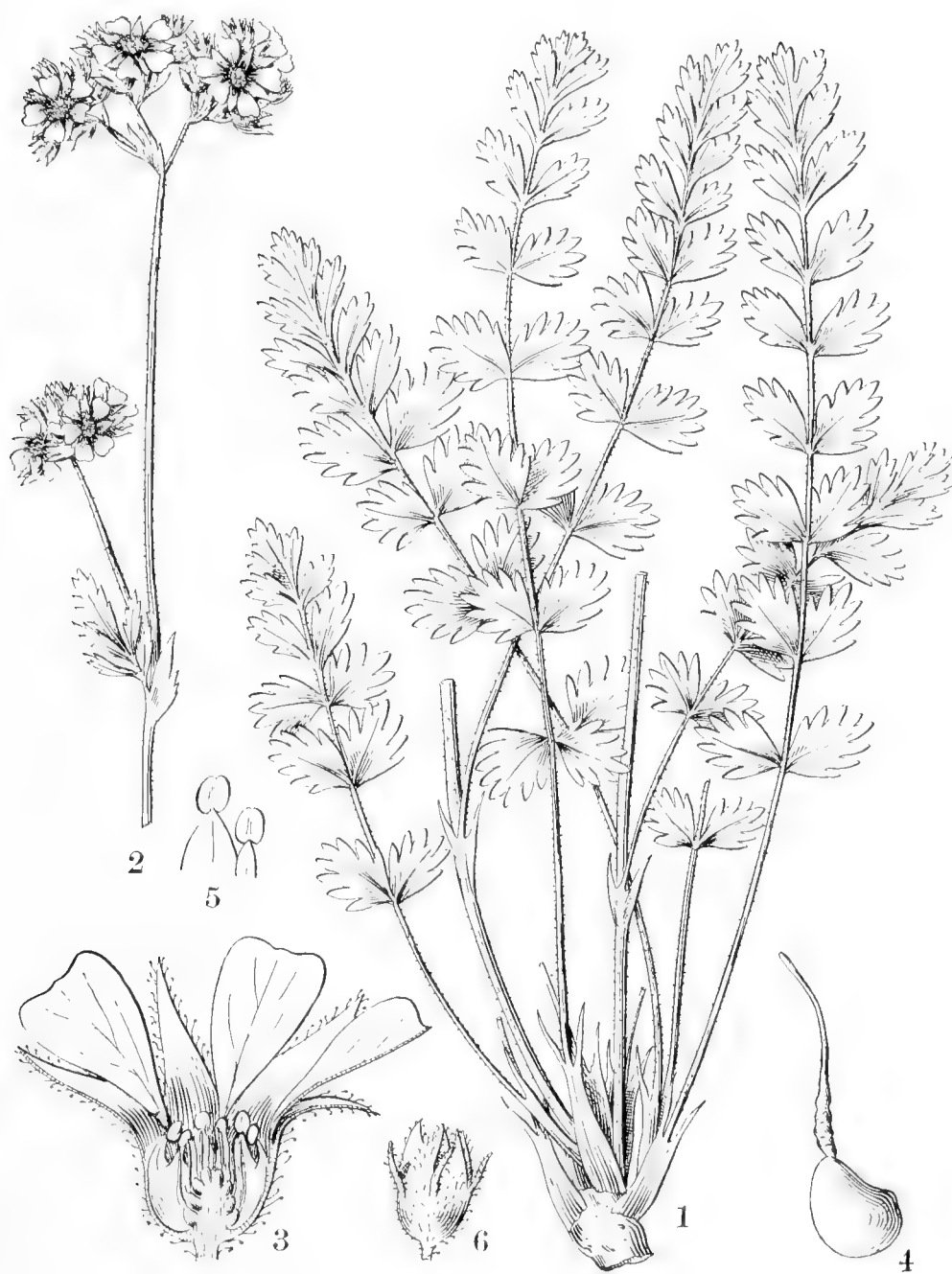
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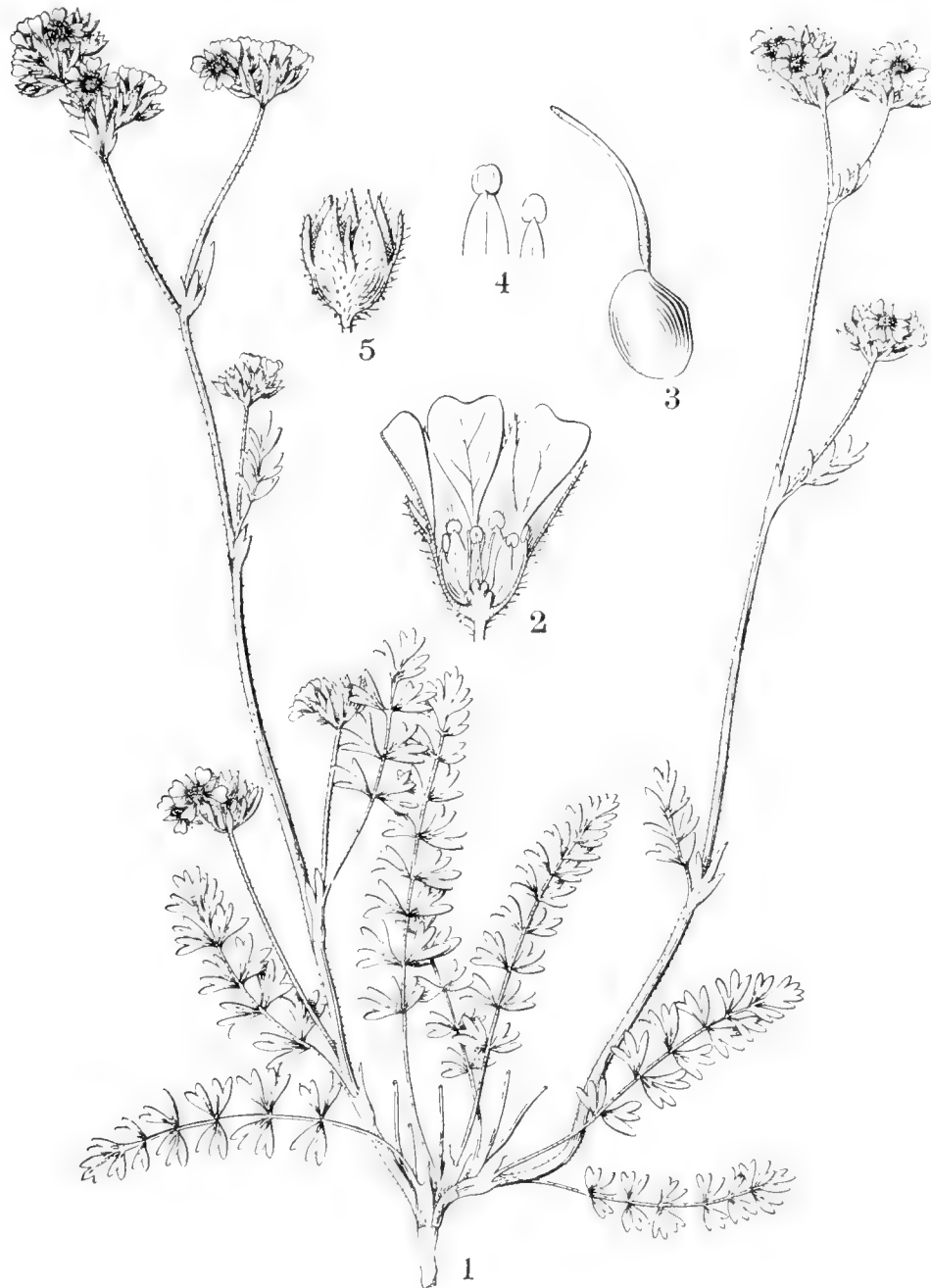
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HORKELIA CAPITATA



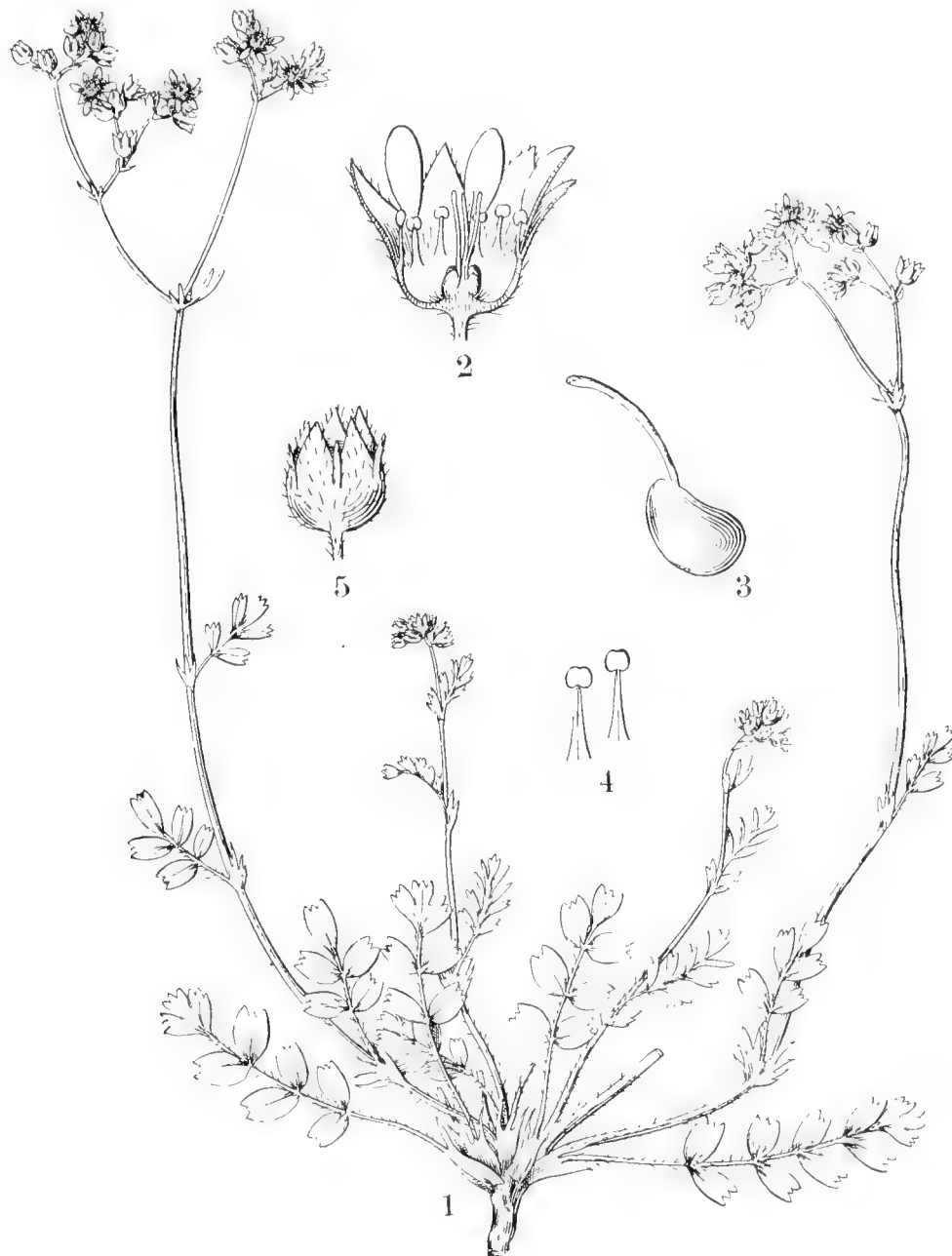
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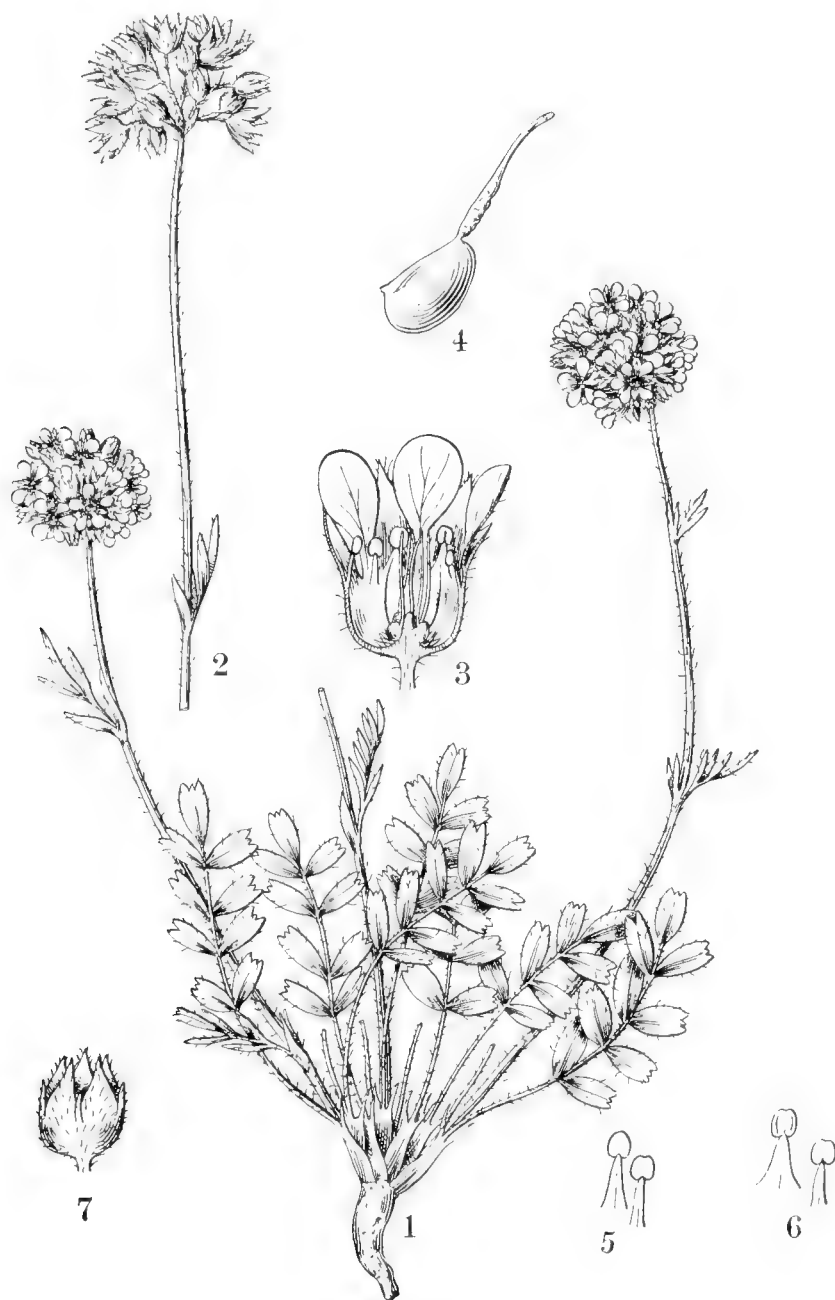
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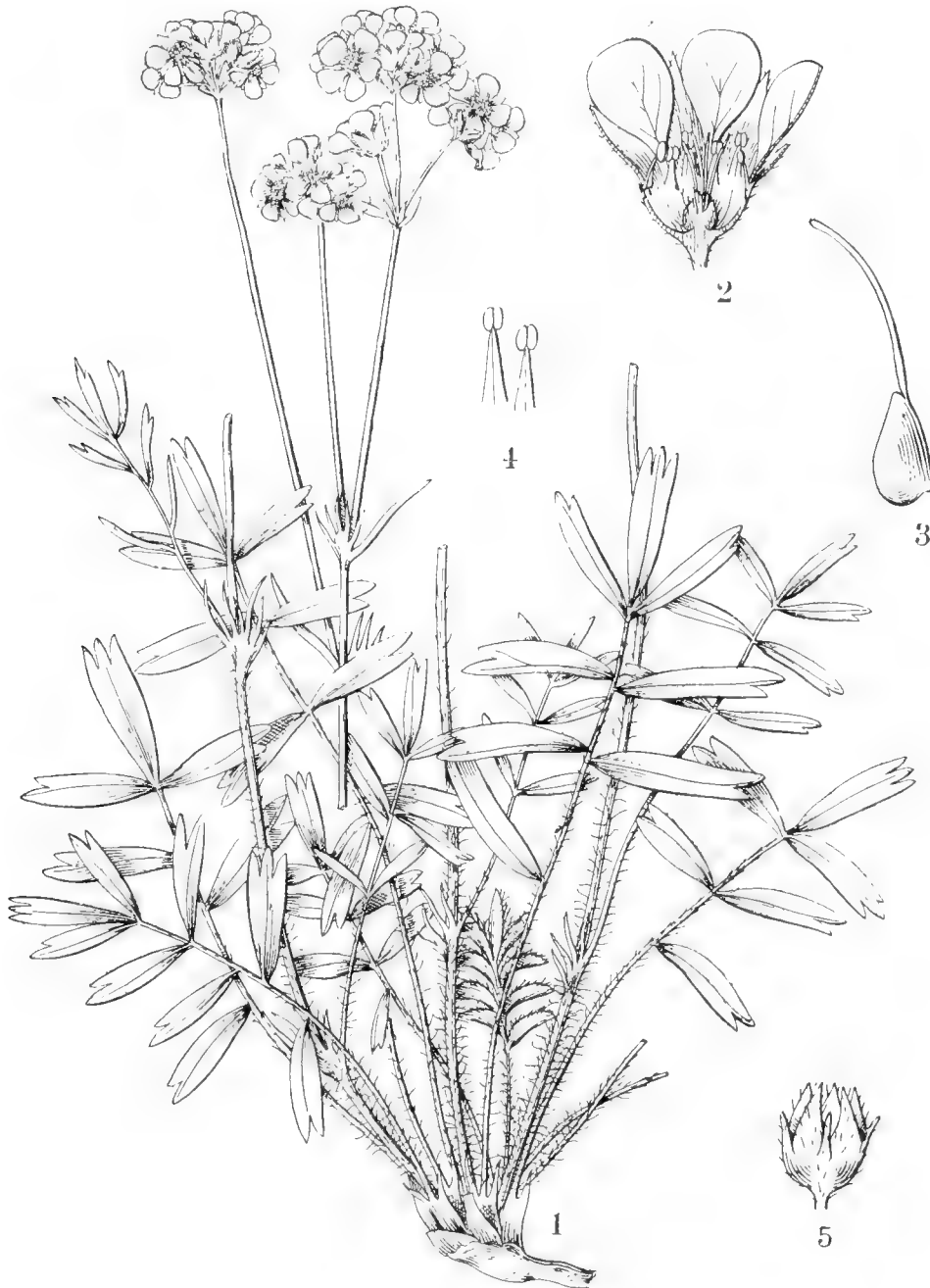
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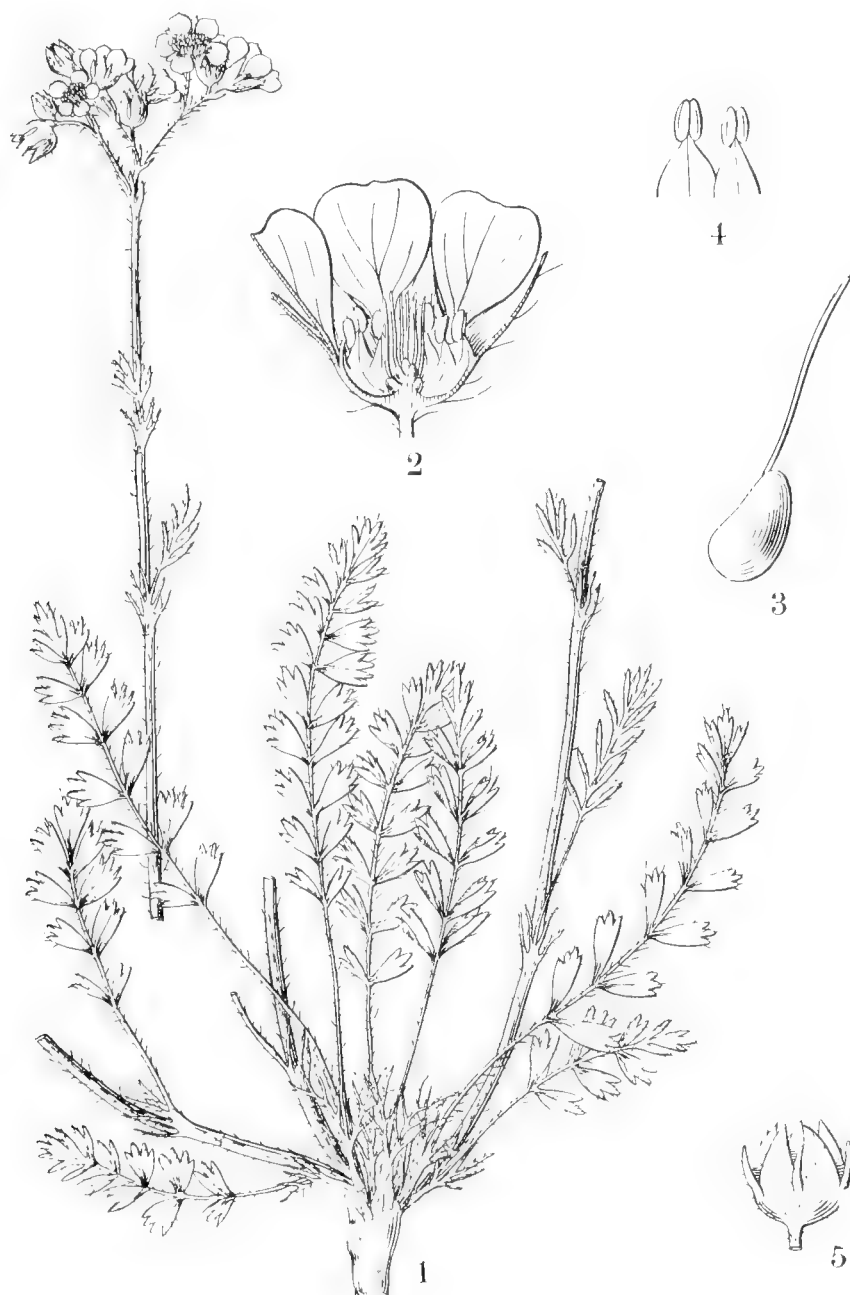
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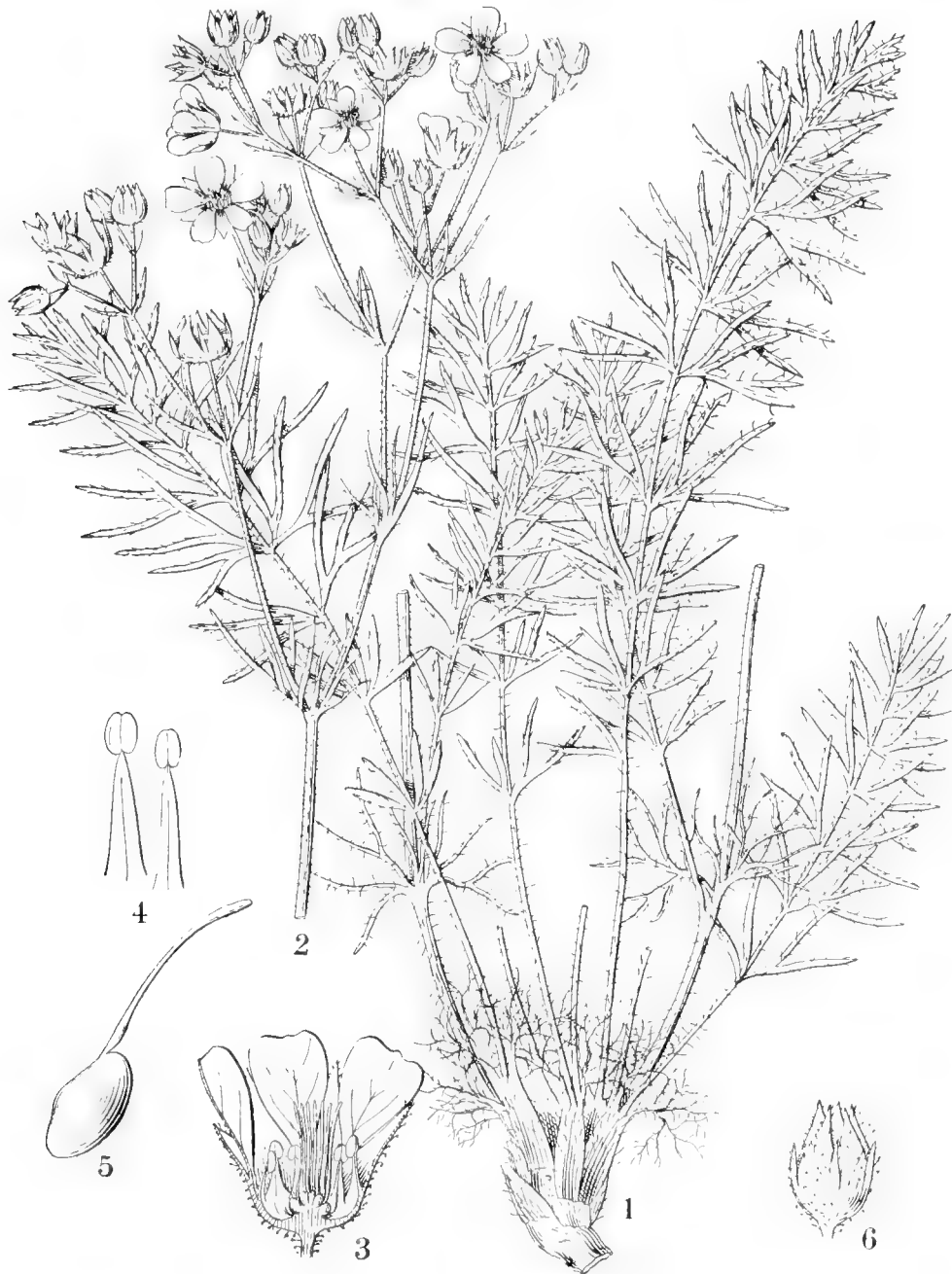
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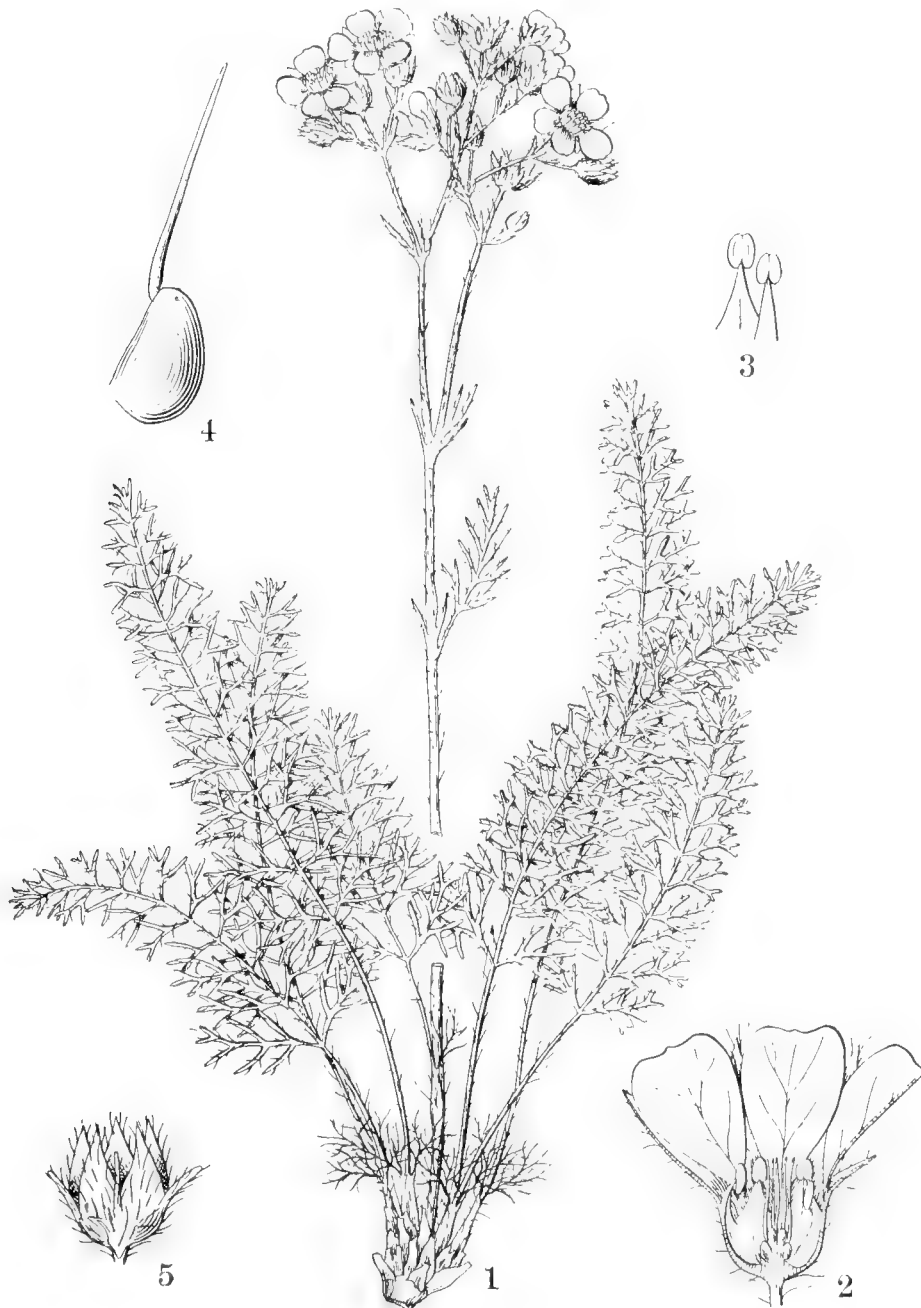
HORKELIA CONGESTA



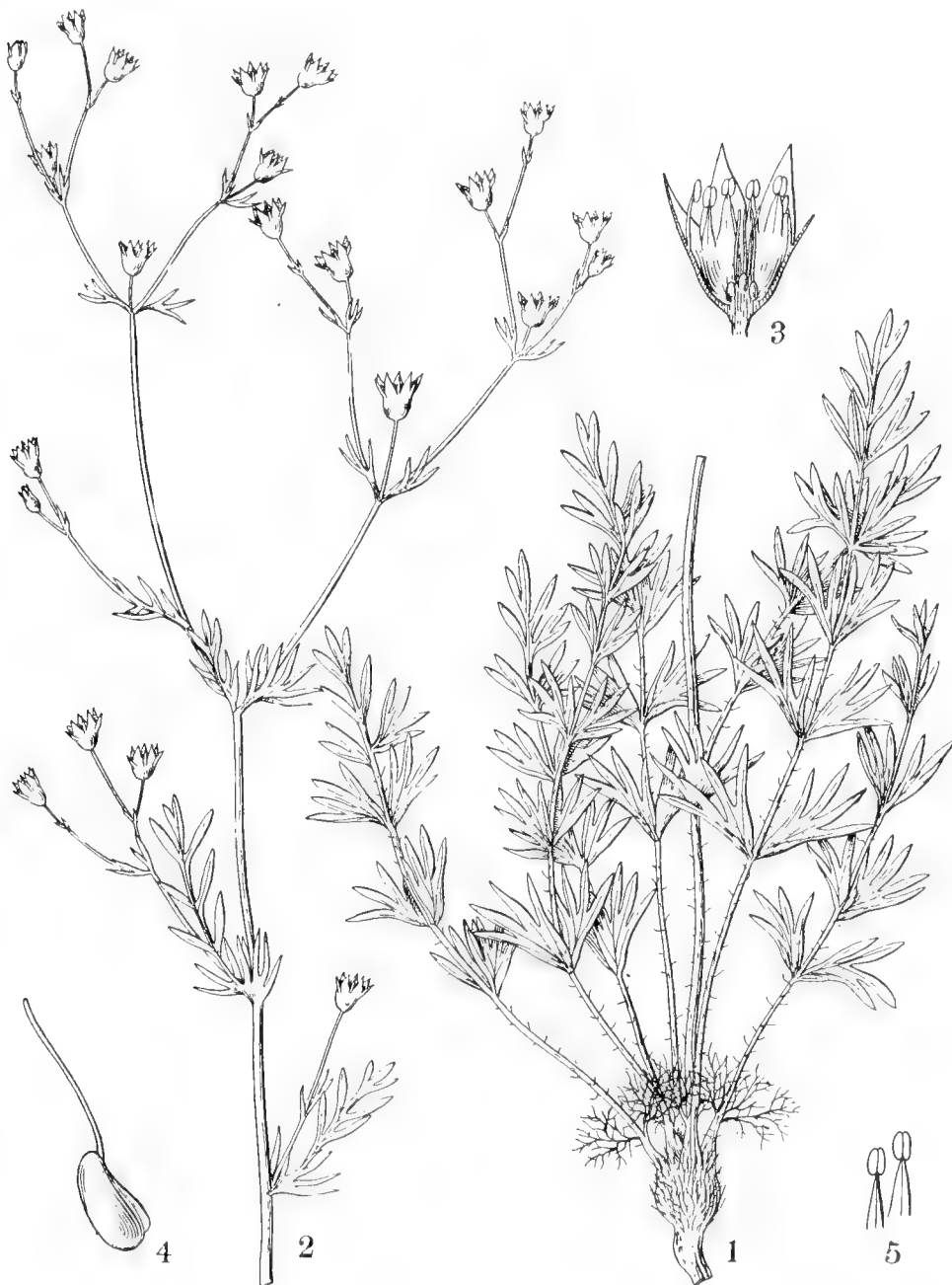
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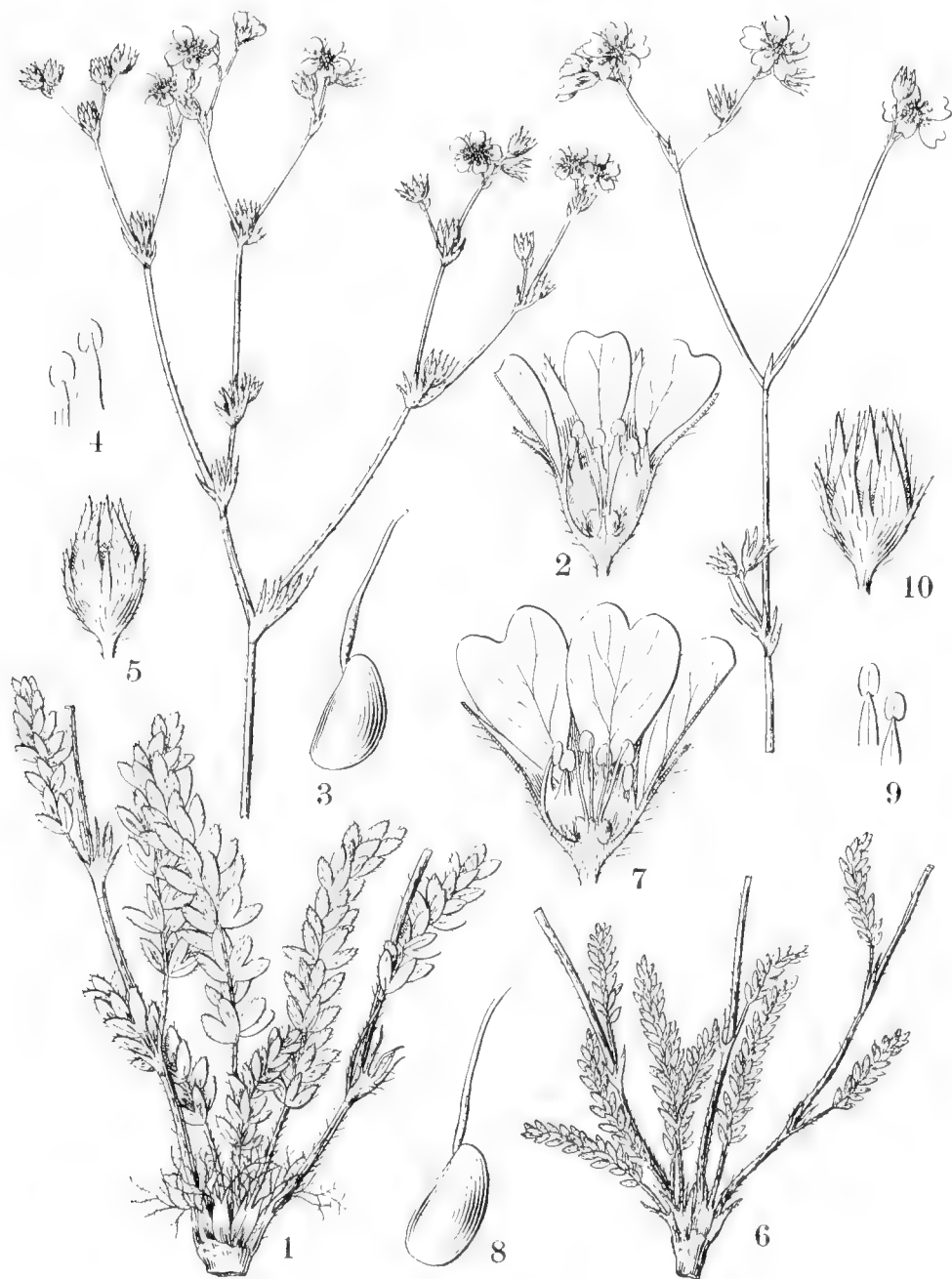
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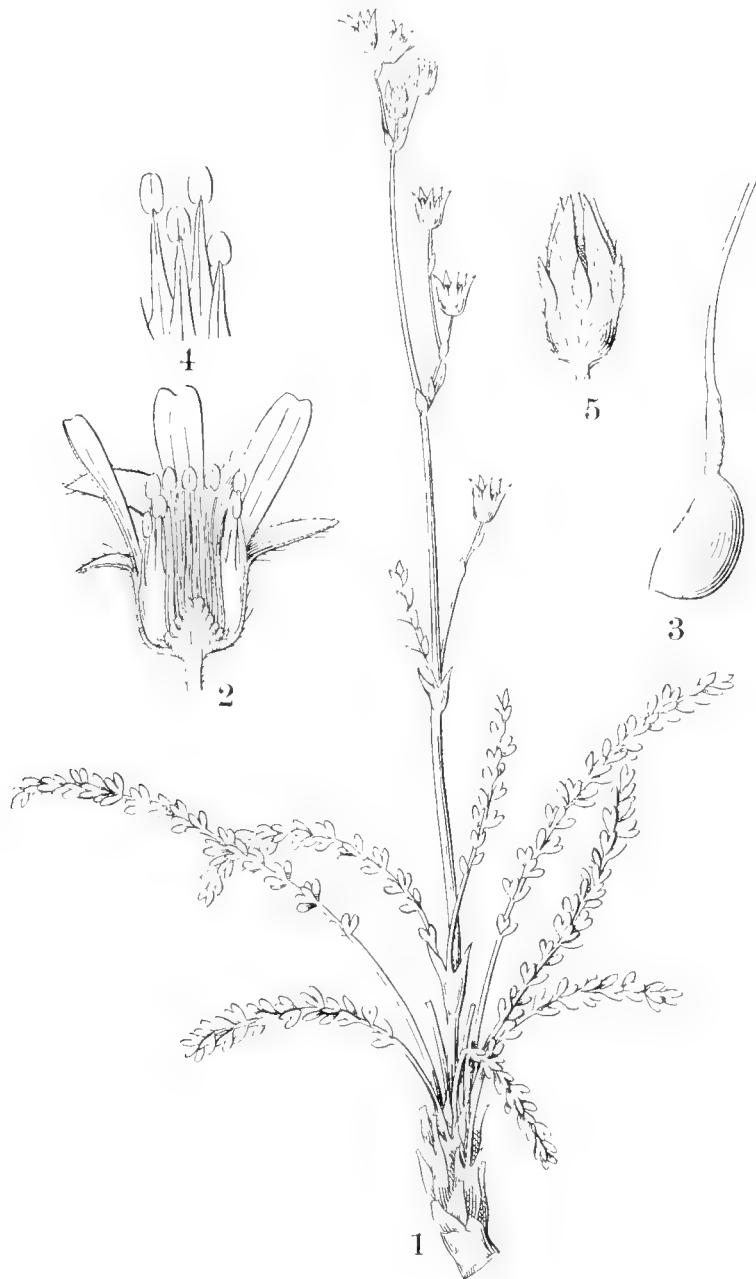
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HORKELIA LAXIFLORA



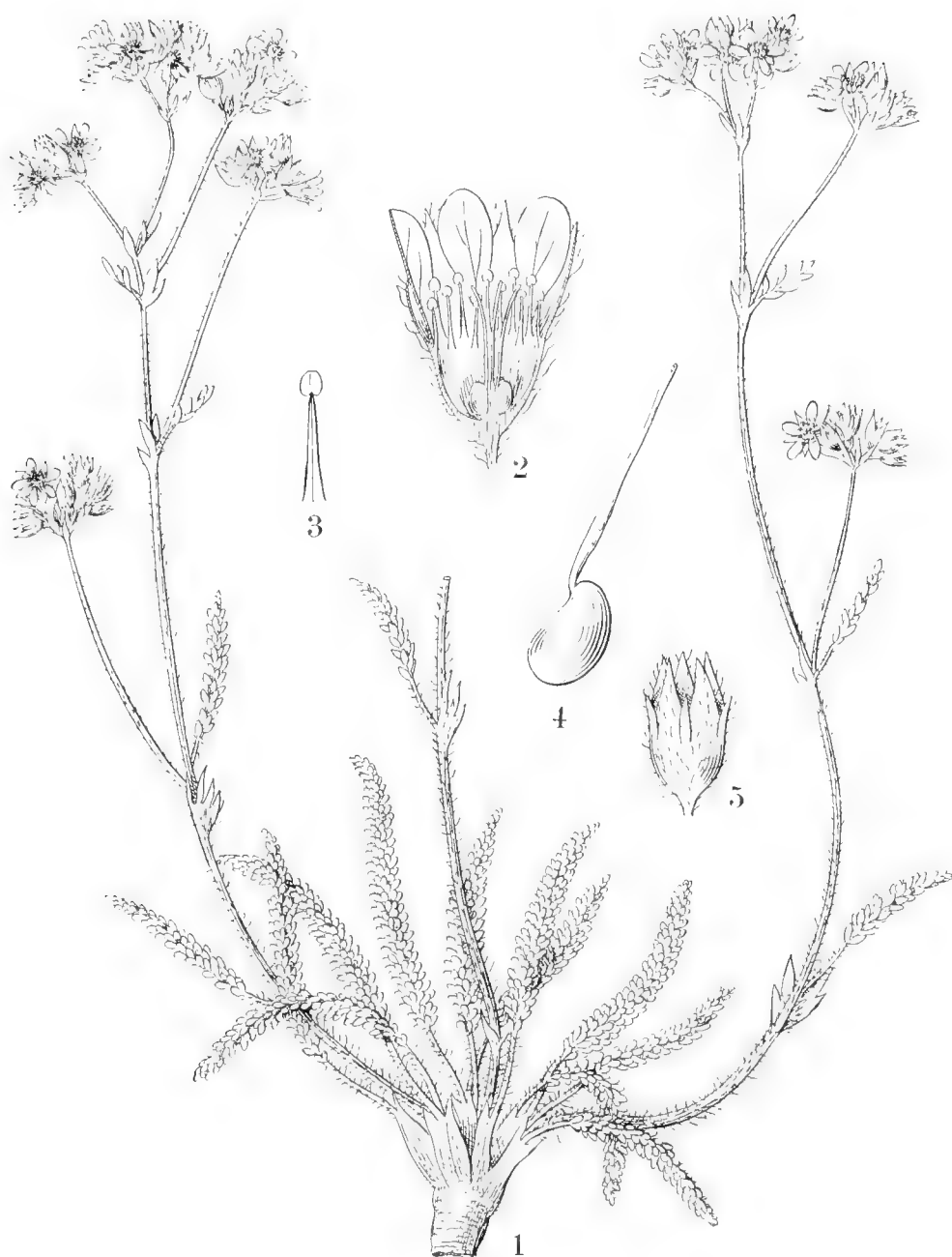
1-5 *HORKELIA HOWELLII* 6-10 *HORKELIA SERICATA*



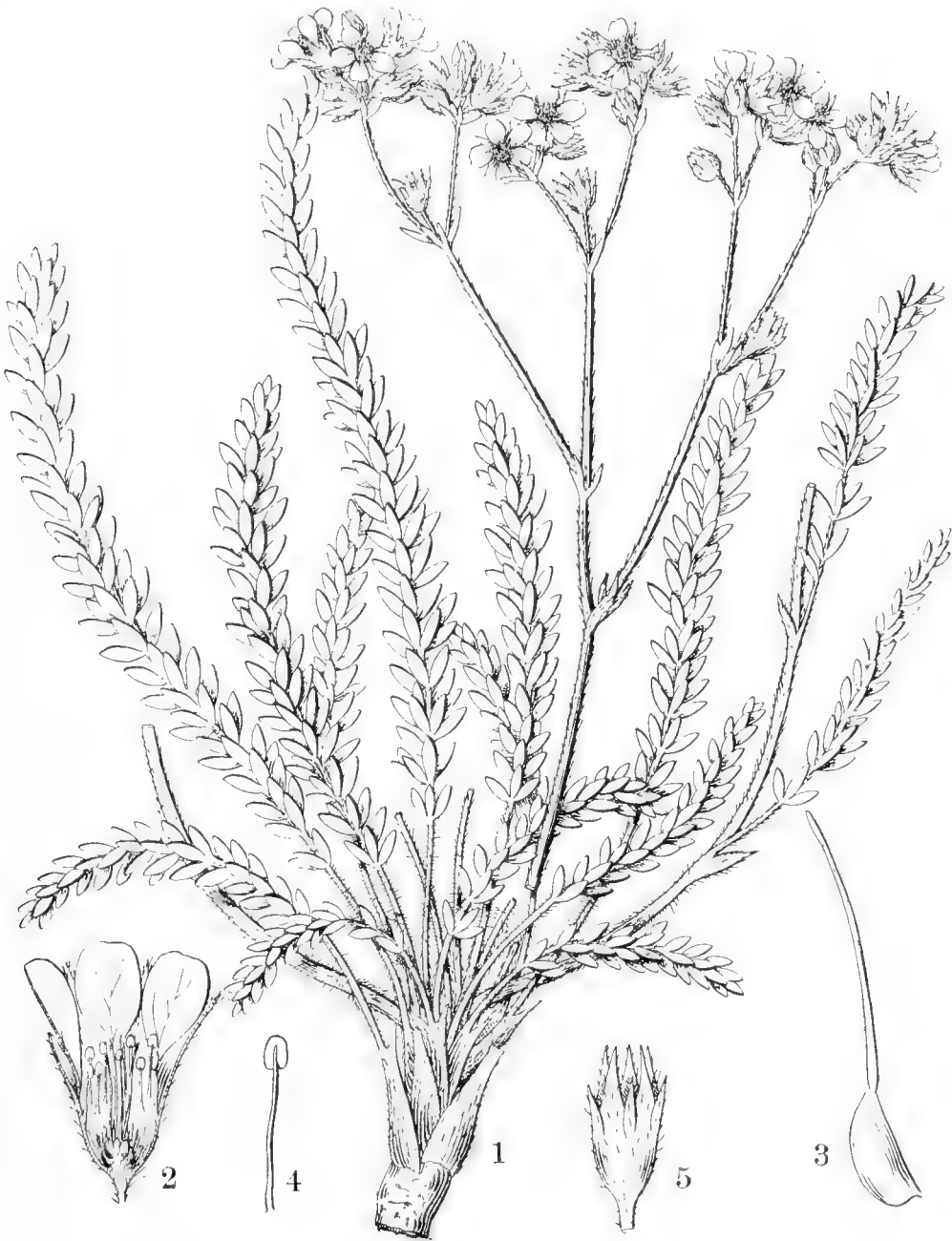
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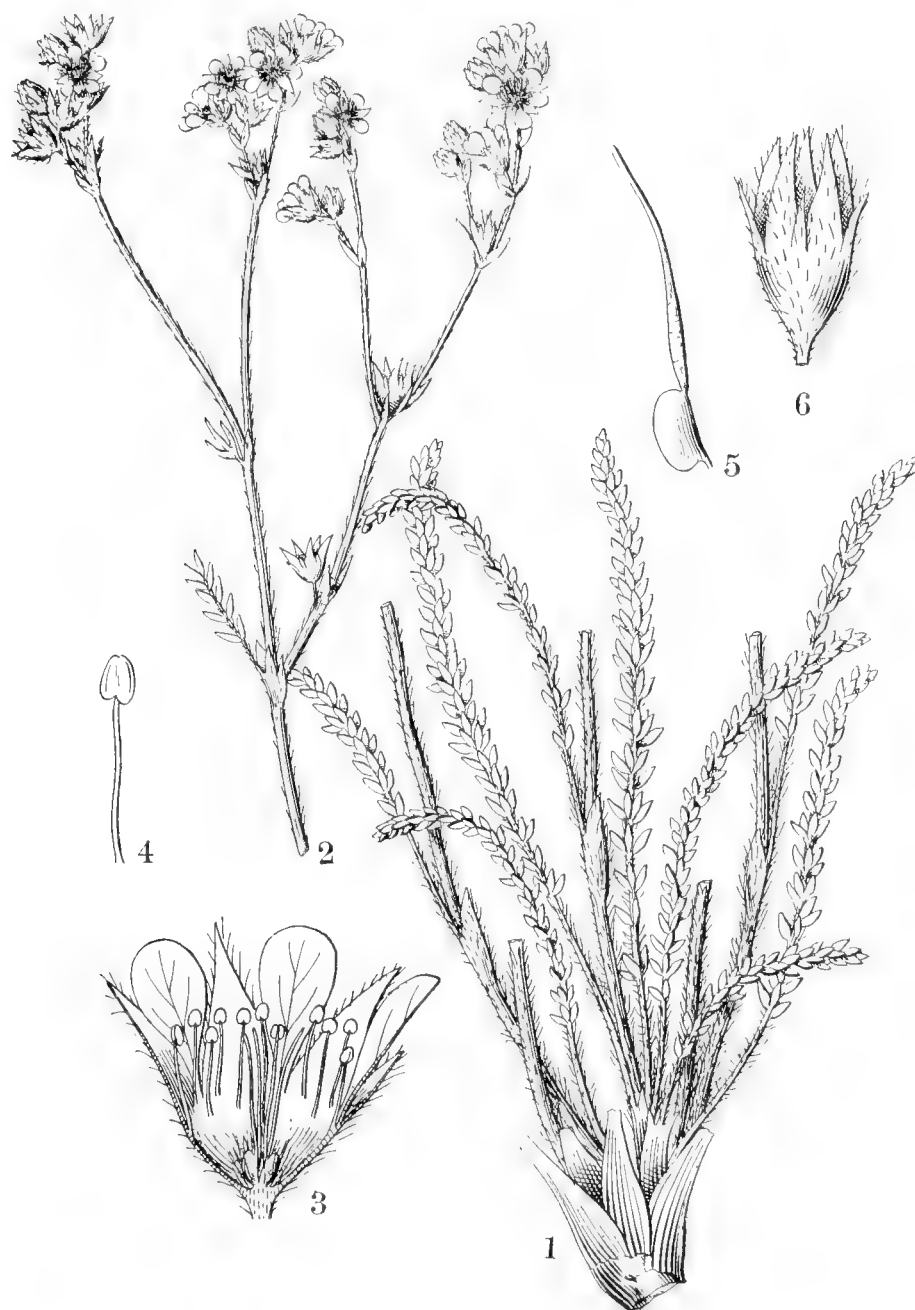
HORKELIA PINETORUM



HORKELIA ARGYROCOMA



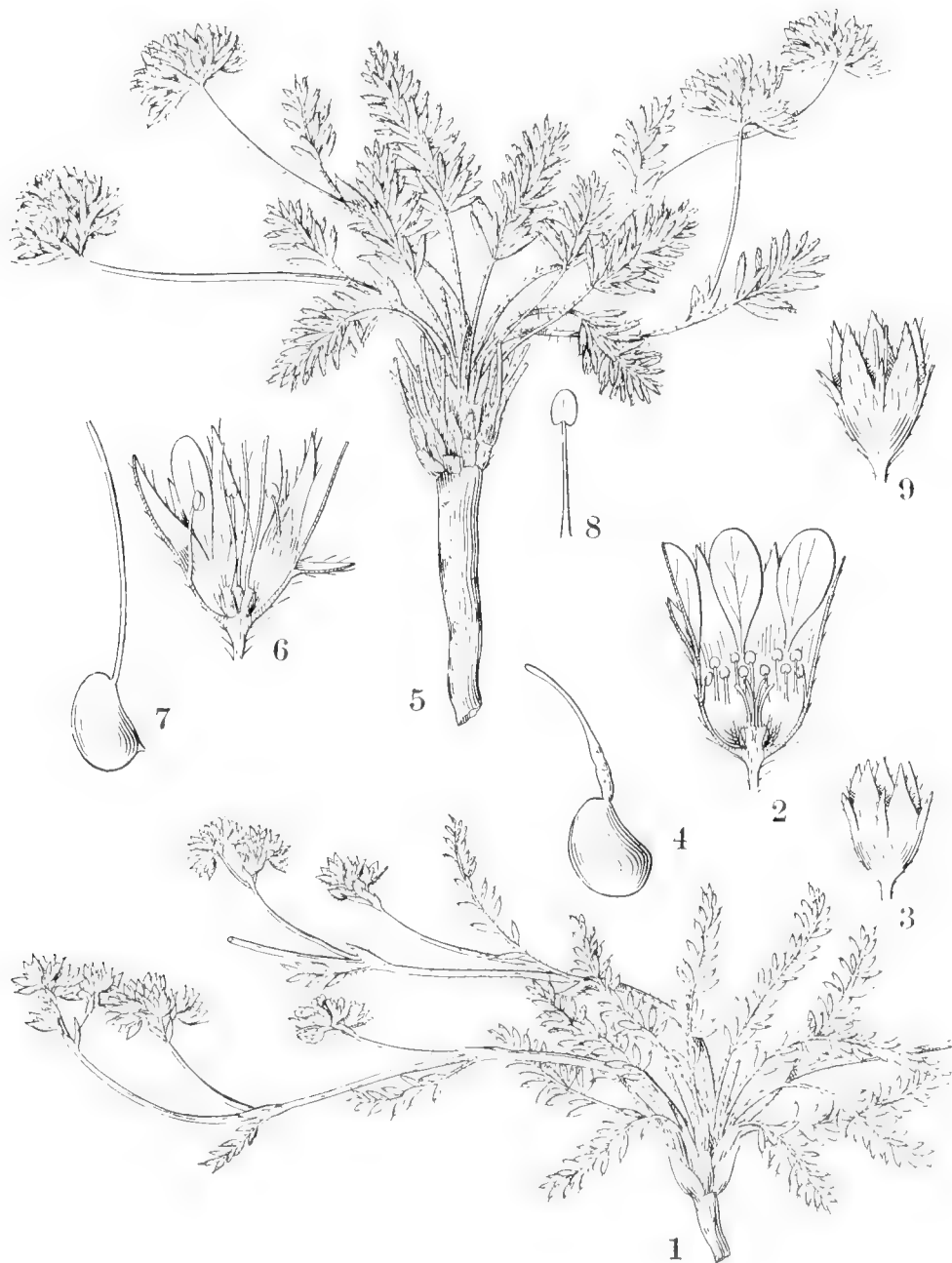
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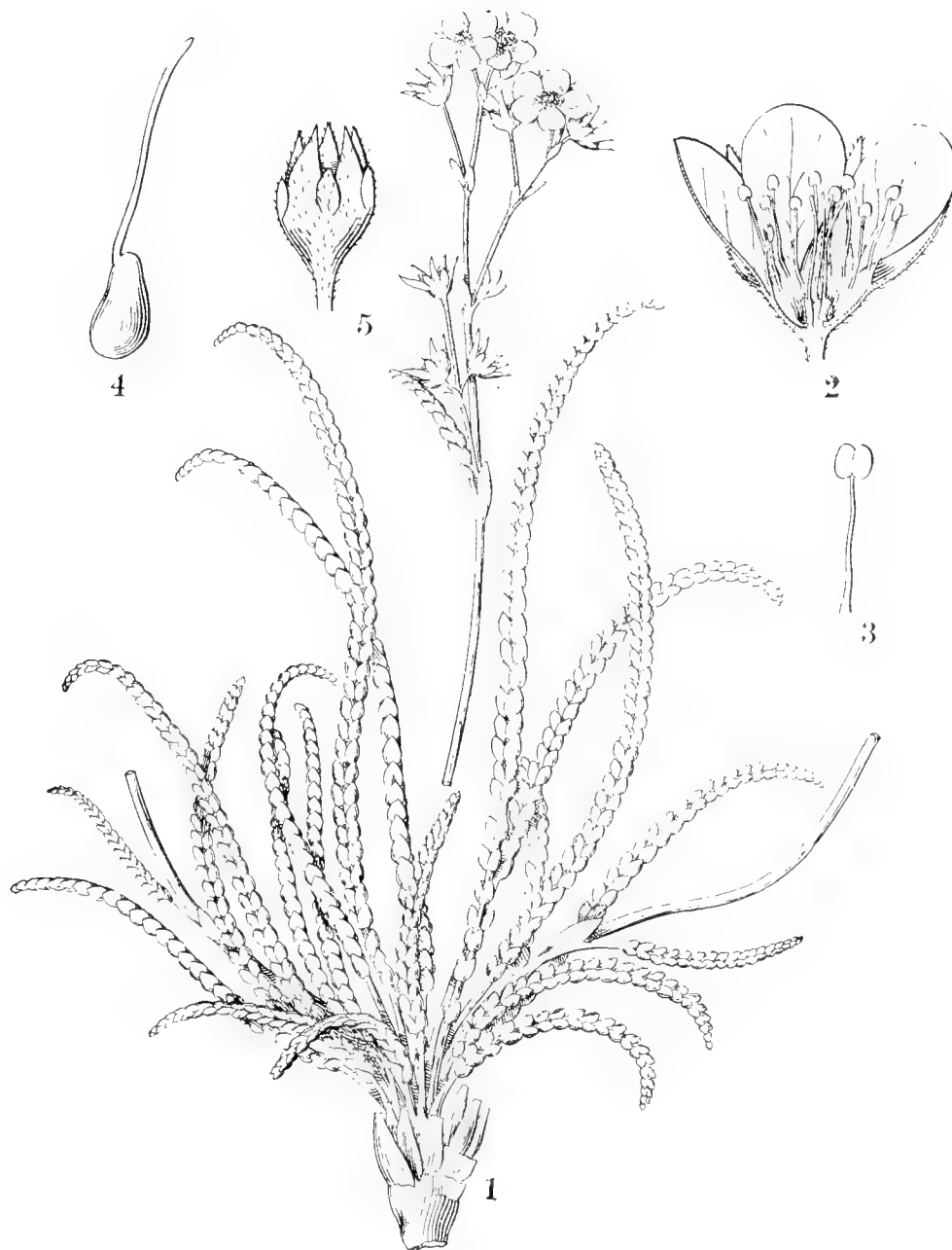
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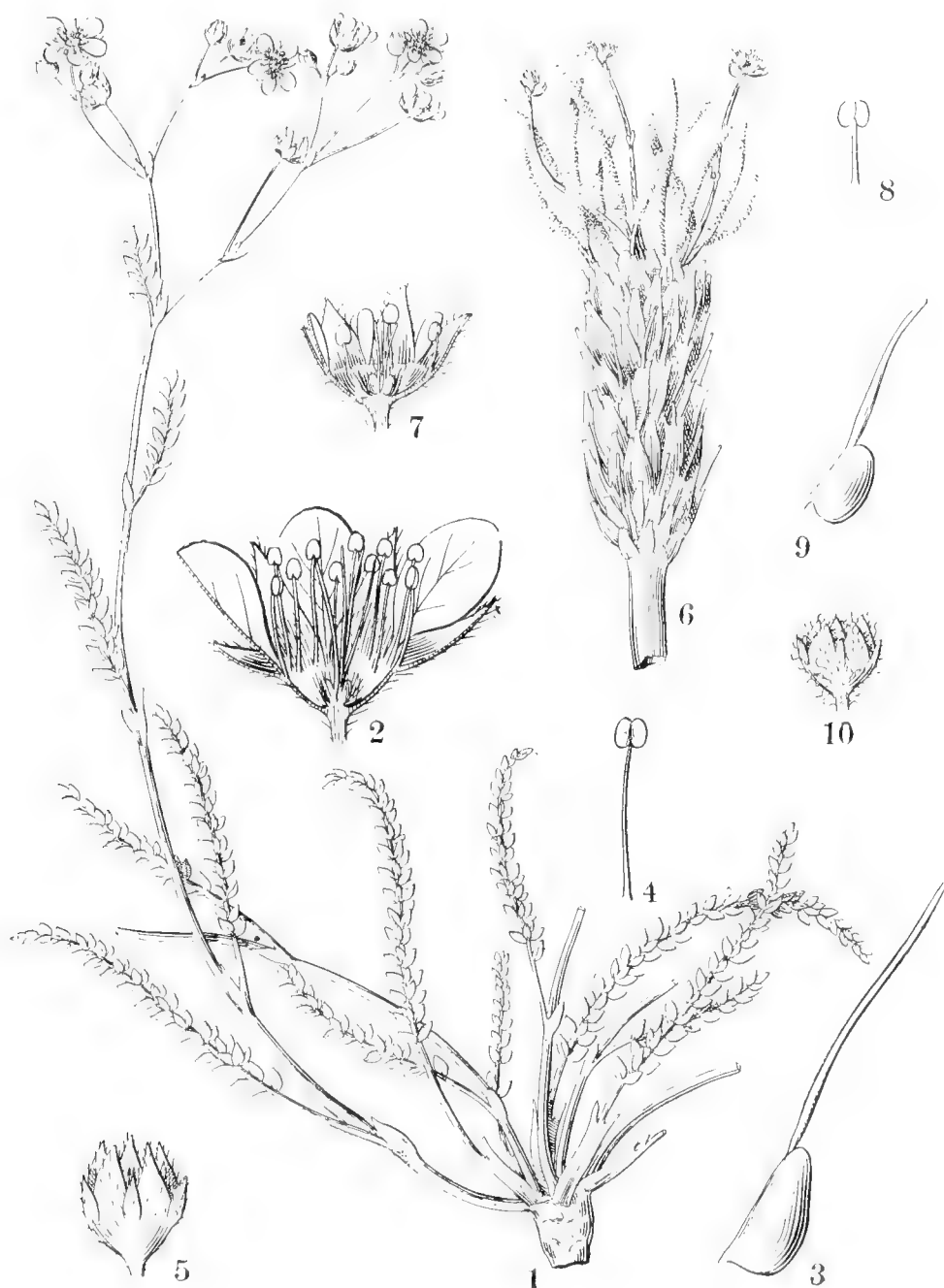
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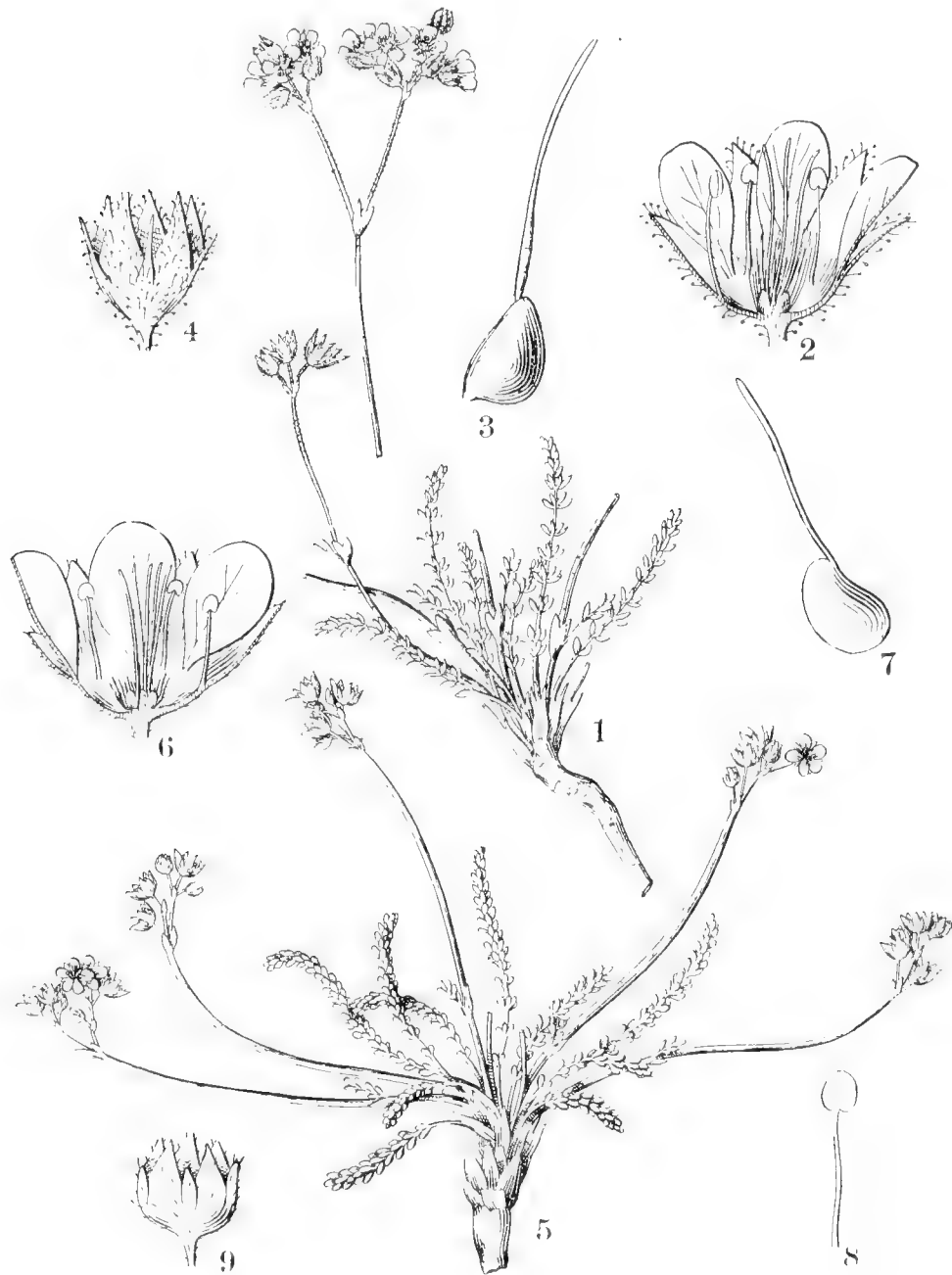
1-4 HORKELIA CAMPESTRIS 5-9 HORKELIA WEBBERI



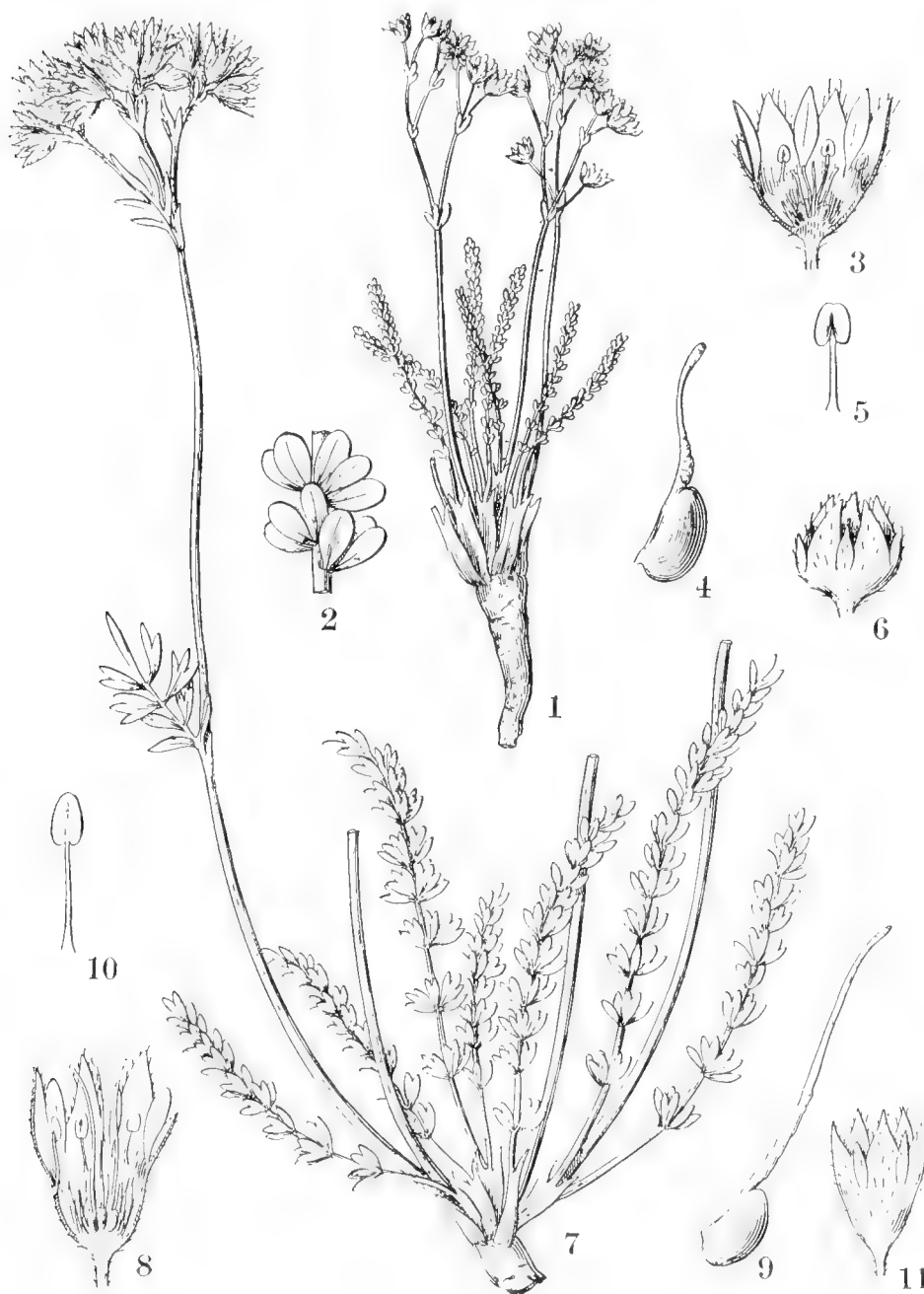
HORKELIA EREMICA



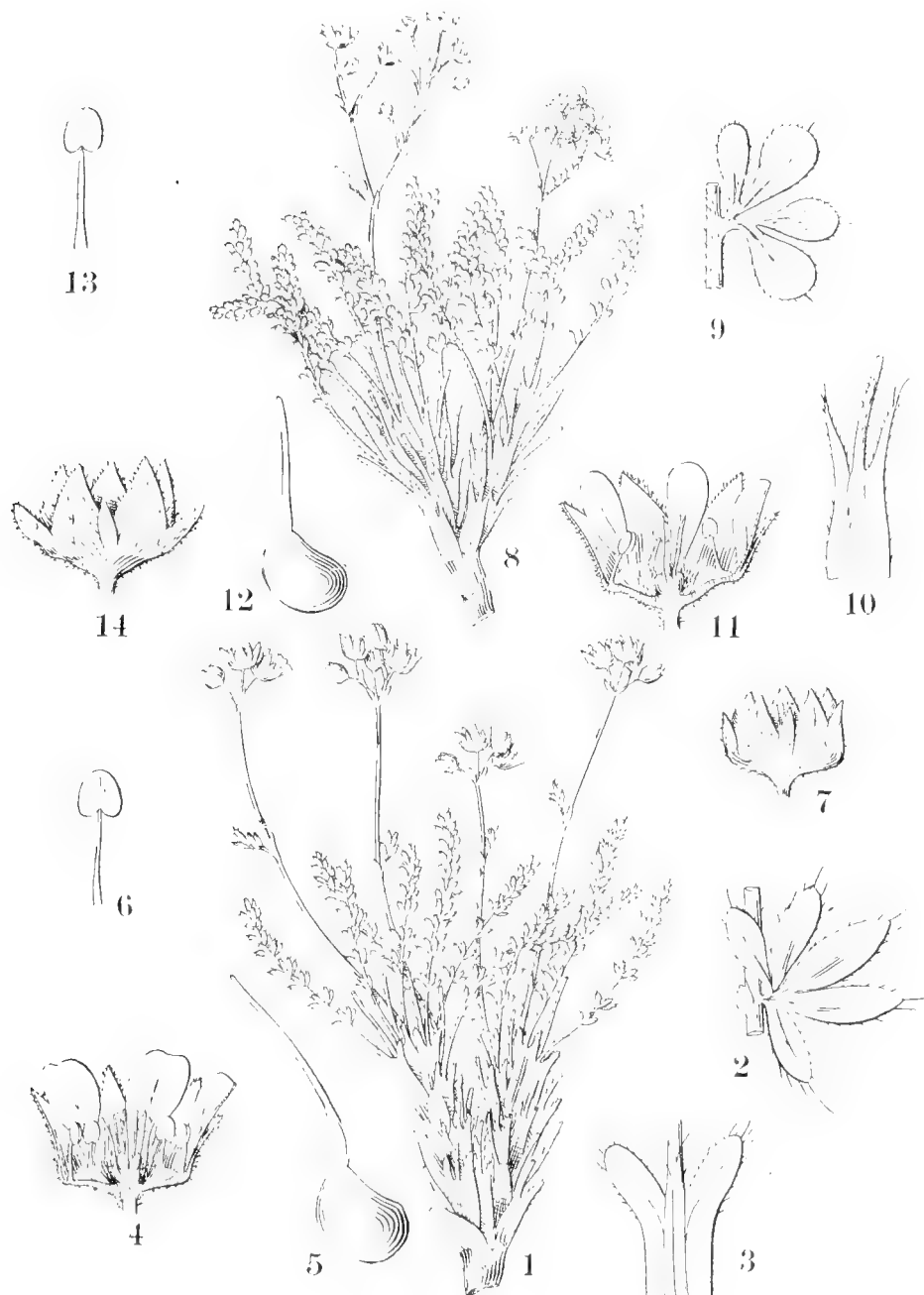
1-5 HORKELIA KINGII 6-10 HORKELIA MUIRII



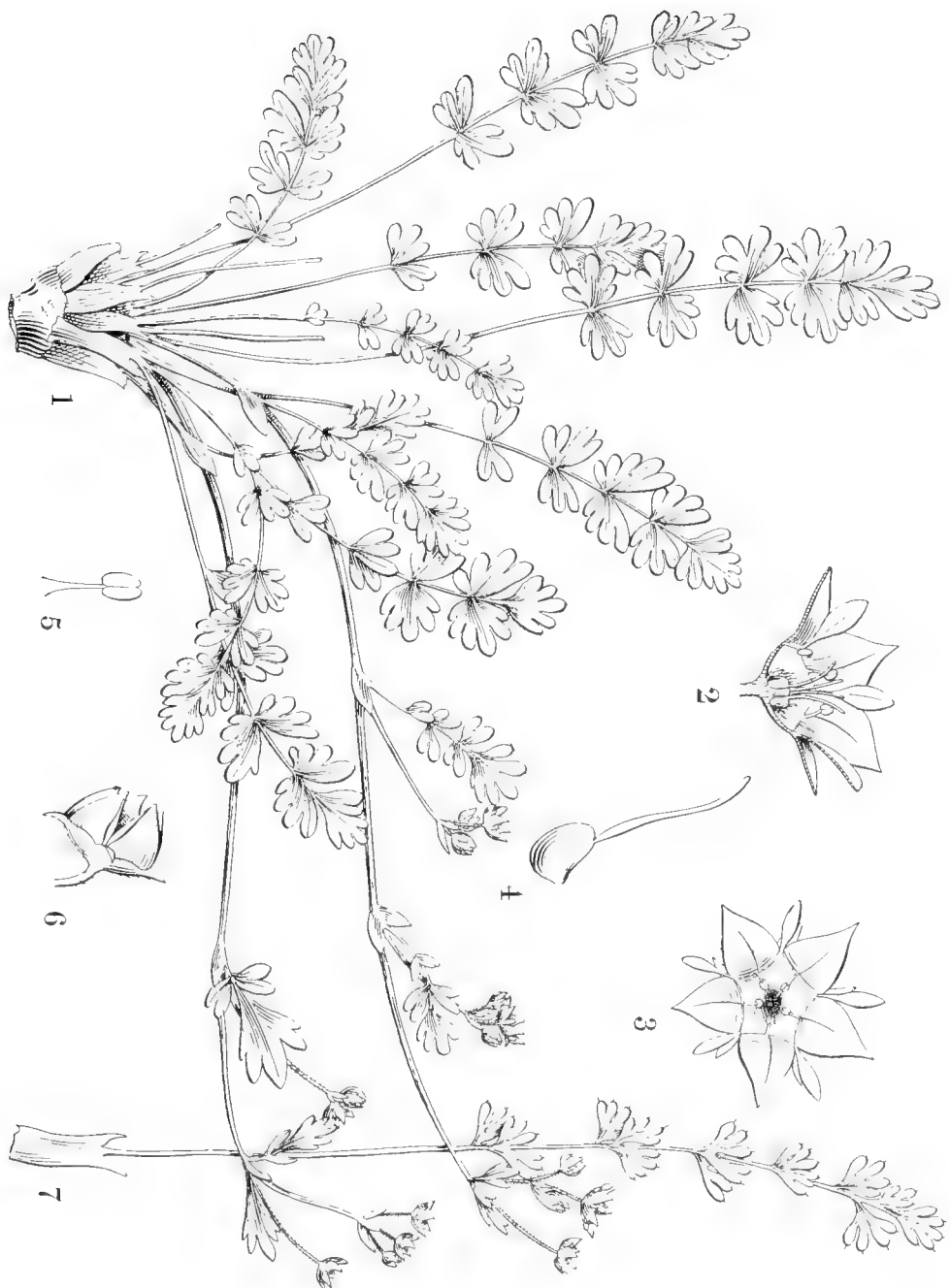
1-4 HORKELIA UTAHENSIS 5-9 HORKELIA SCANDULARIS



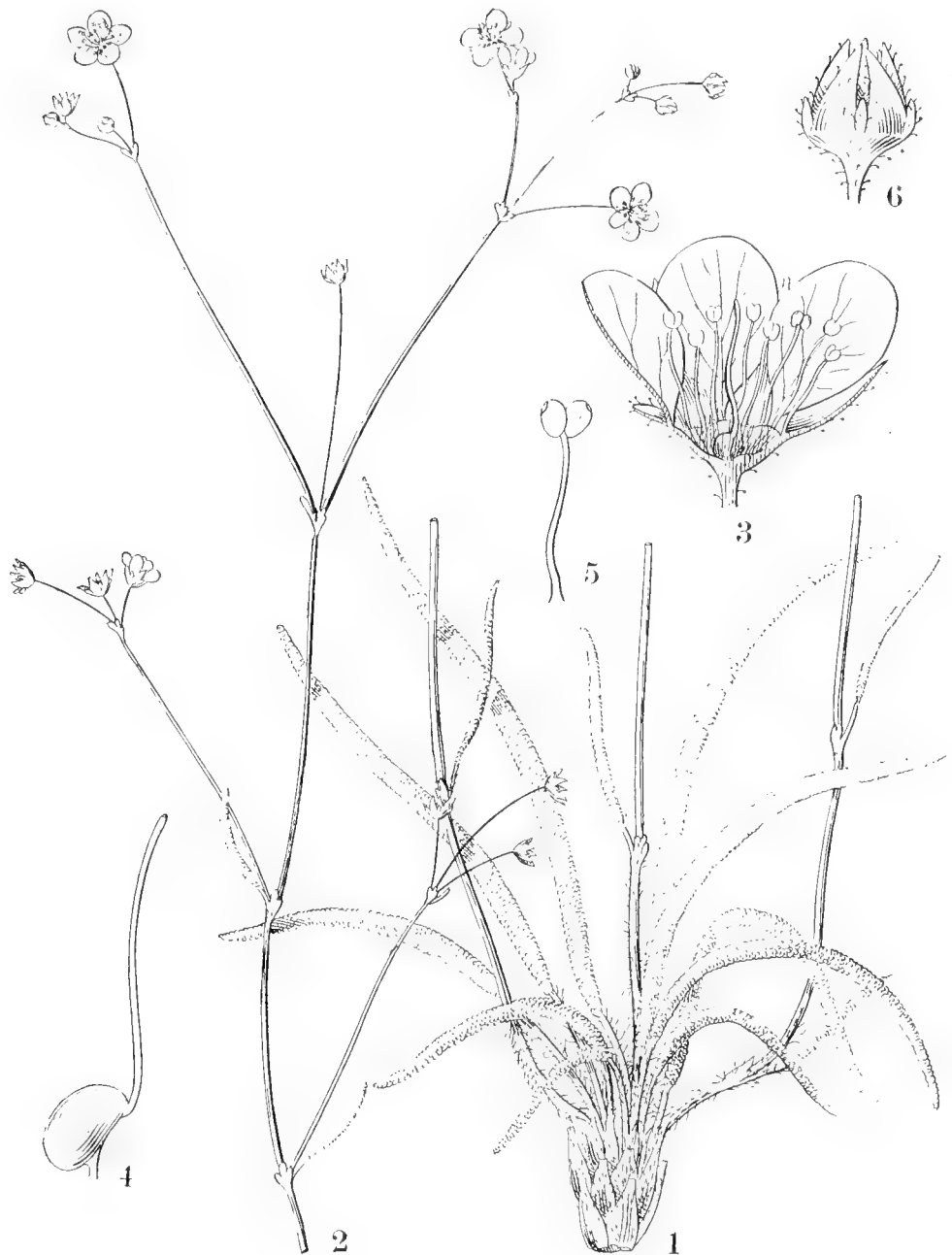
1-6 HORKELIA LYCOPODIOIDES 7-11 HORKELIA GORDONII



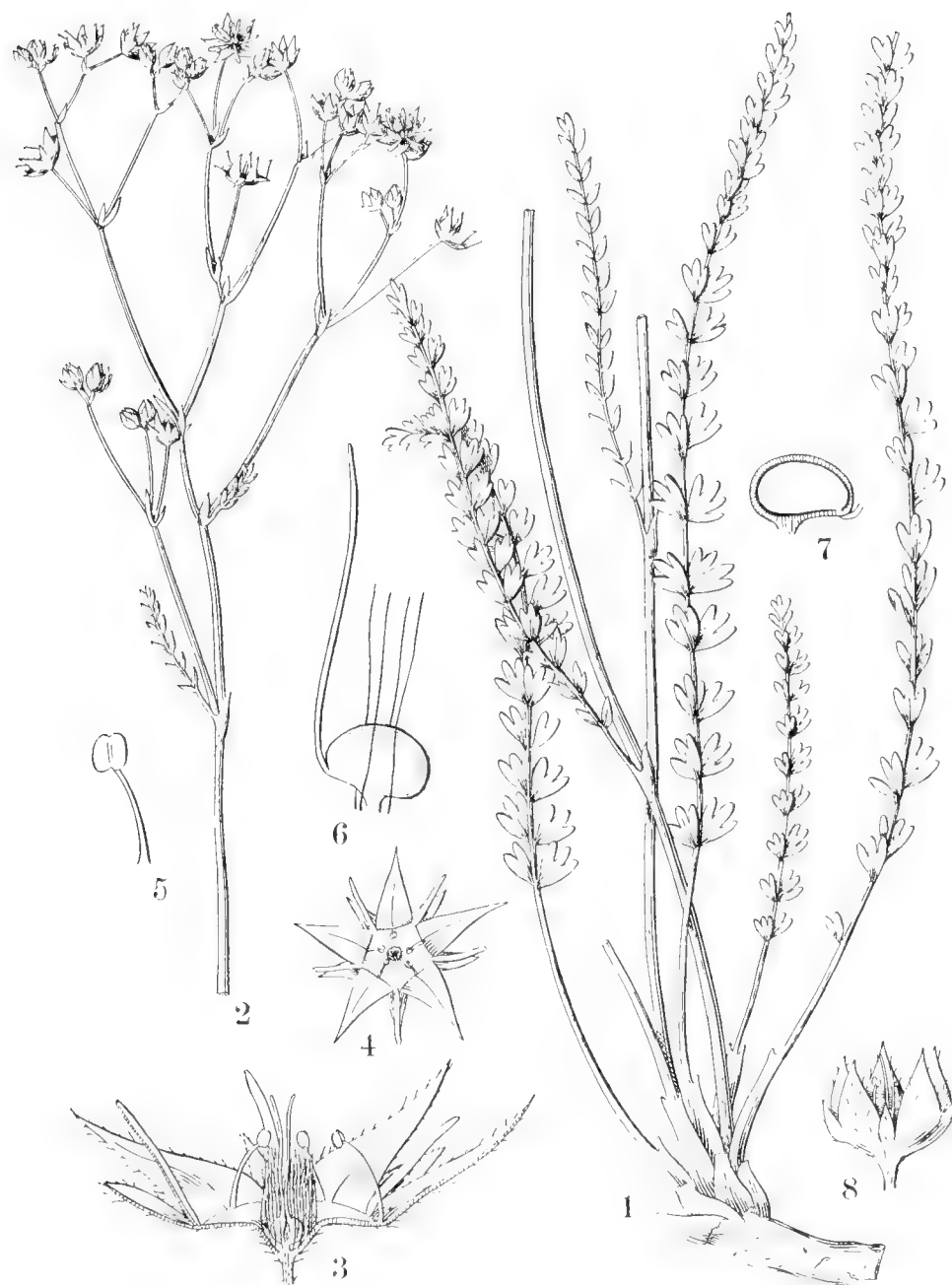
1-7 HORKELIA PYGMAEA 8-14 HORKELIA SHOCKLEYI



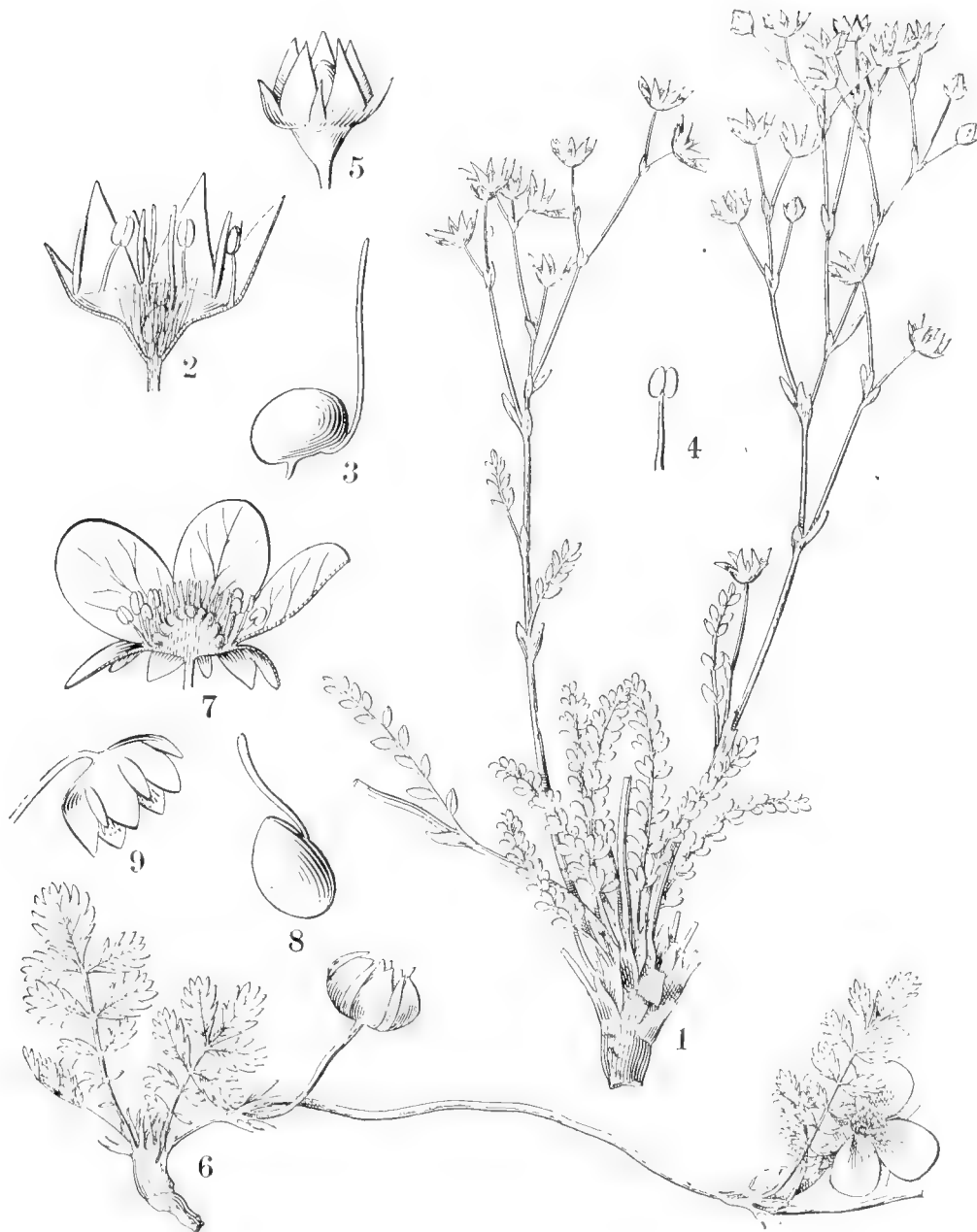
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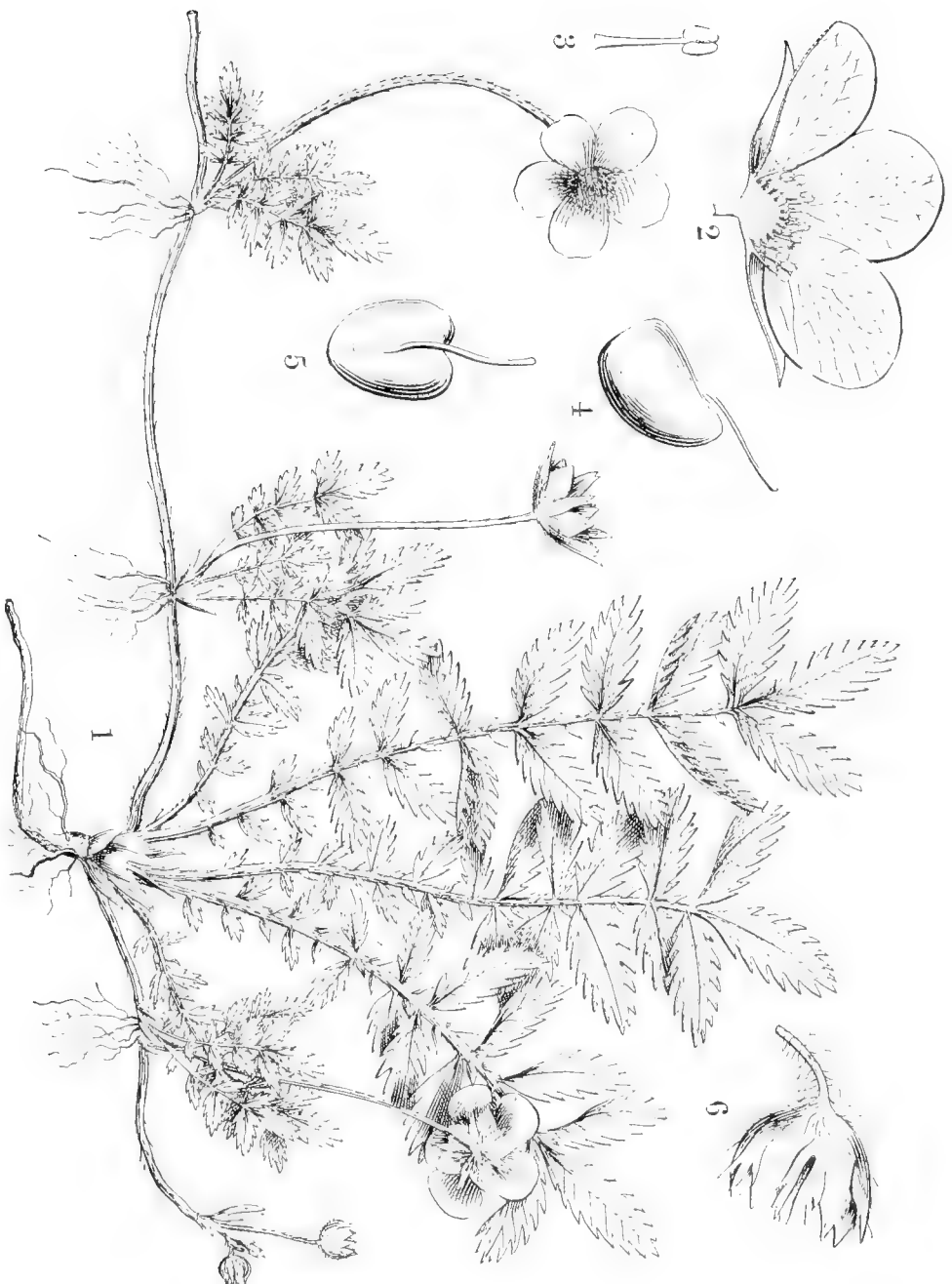
STELLARIOPSIS SANTOLINOIDES



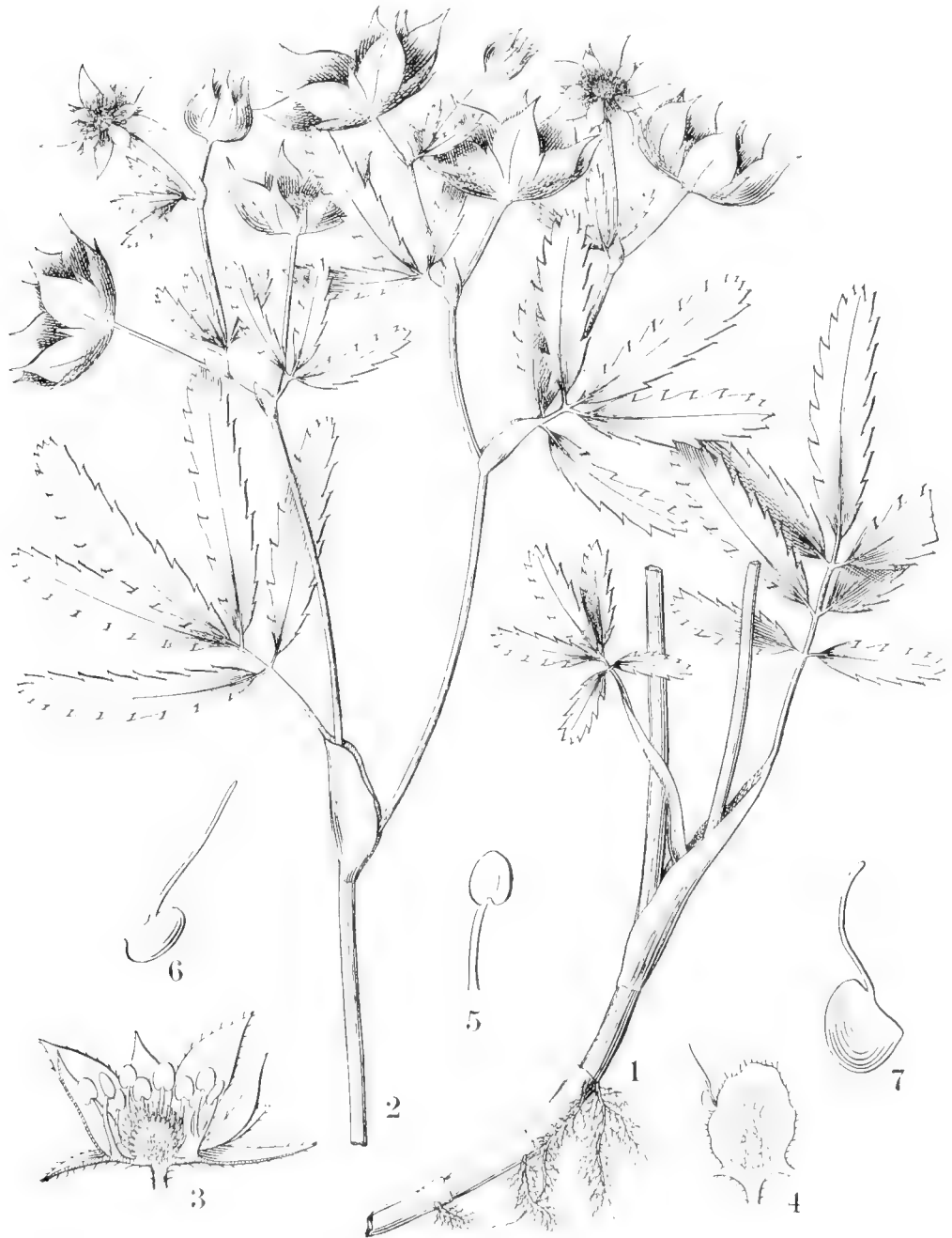
COMARELLA MULTIFOLIOLATA



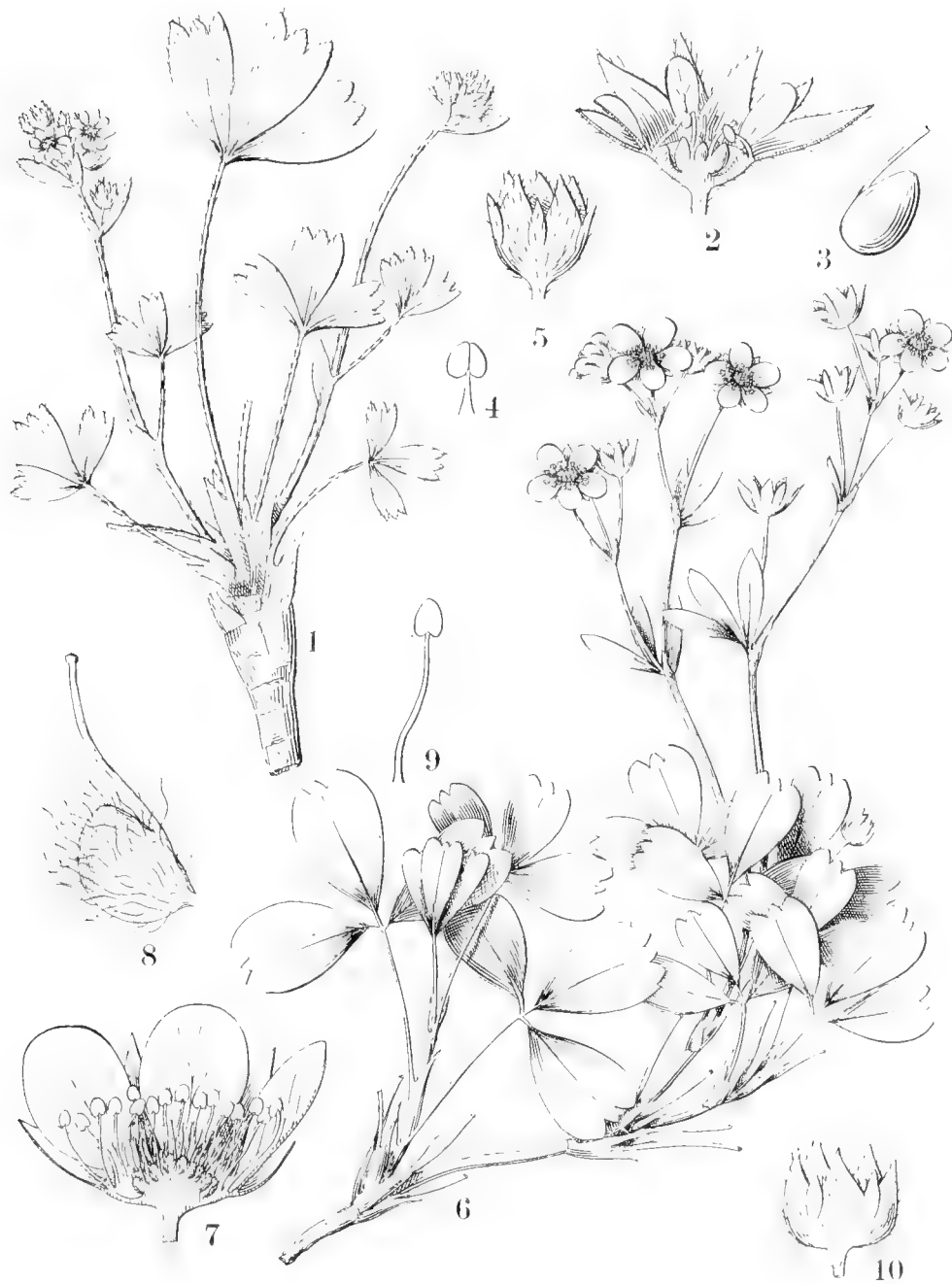
1-5 *COMARELLA SABULOSA*. 6-9 *ARGENTINA EGEDI*



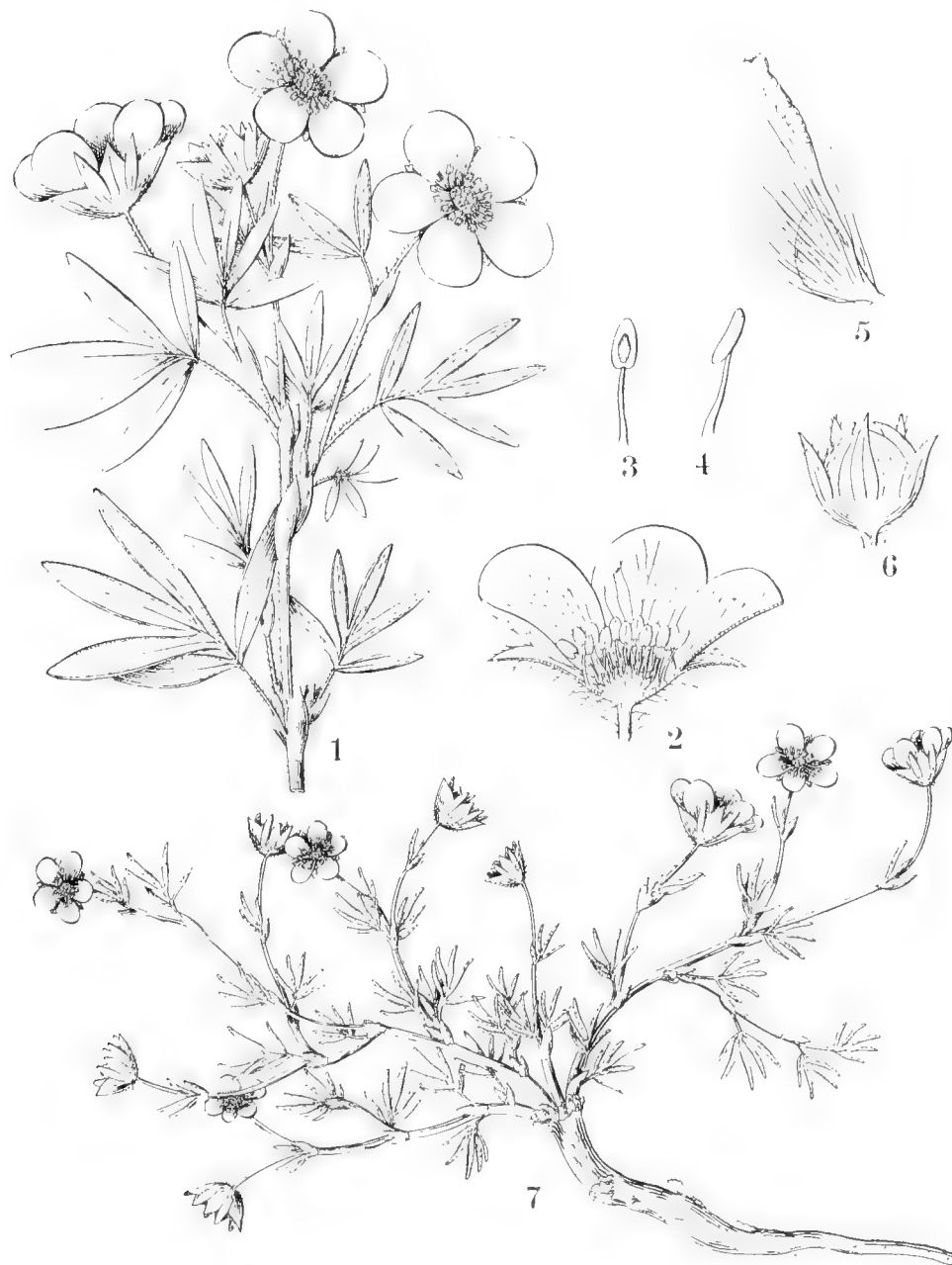
ARGENTINA ANSERINA



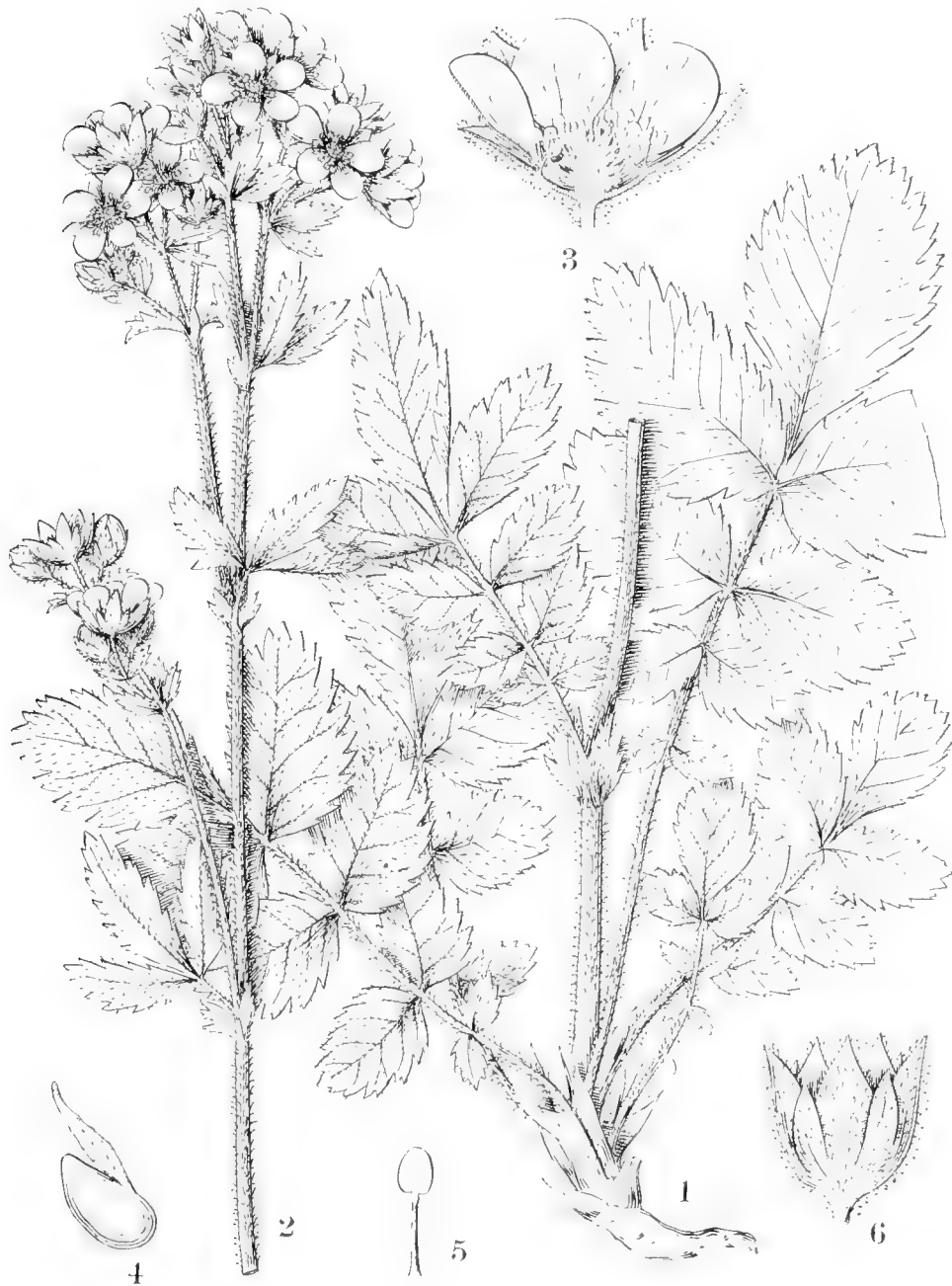
COMARUM PALUSTRE



1-5 SIBBALDIA PROCUMBENS 6-10 SIBBALDIOPSIS TRIDENTATA



1-6 COMOCARPA FRUTICOSA; 7 VAR. MONTICOLA



DRYMOCALLIS ARGUTA



DRYMOCALLIS PSEUDORUPESTRIS



DRYMOCALLIS CONVALLARIA



DRYMOCALLIS GLUTINOSA



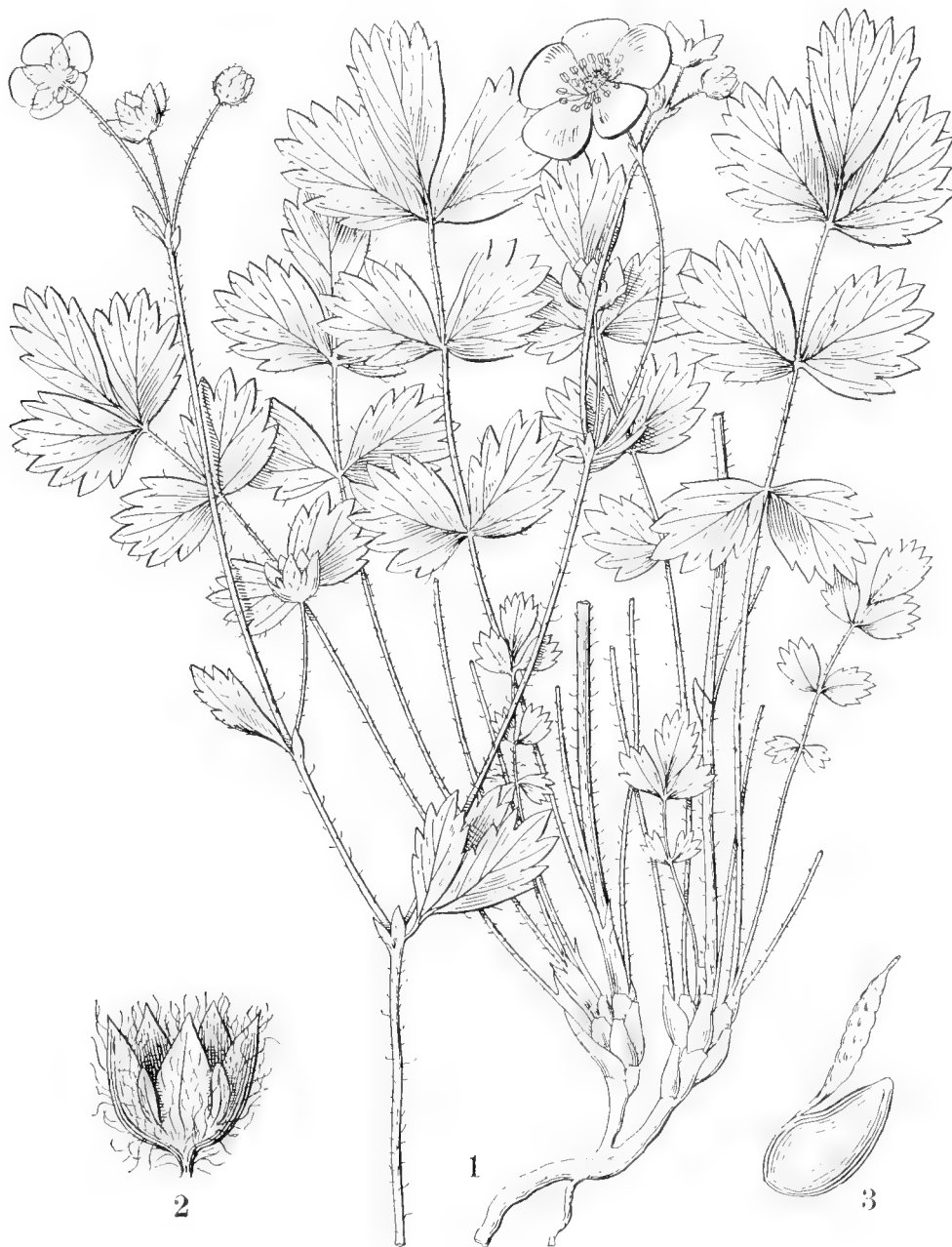
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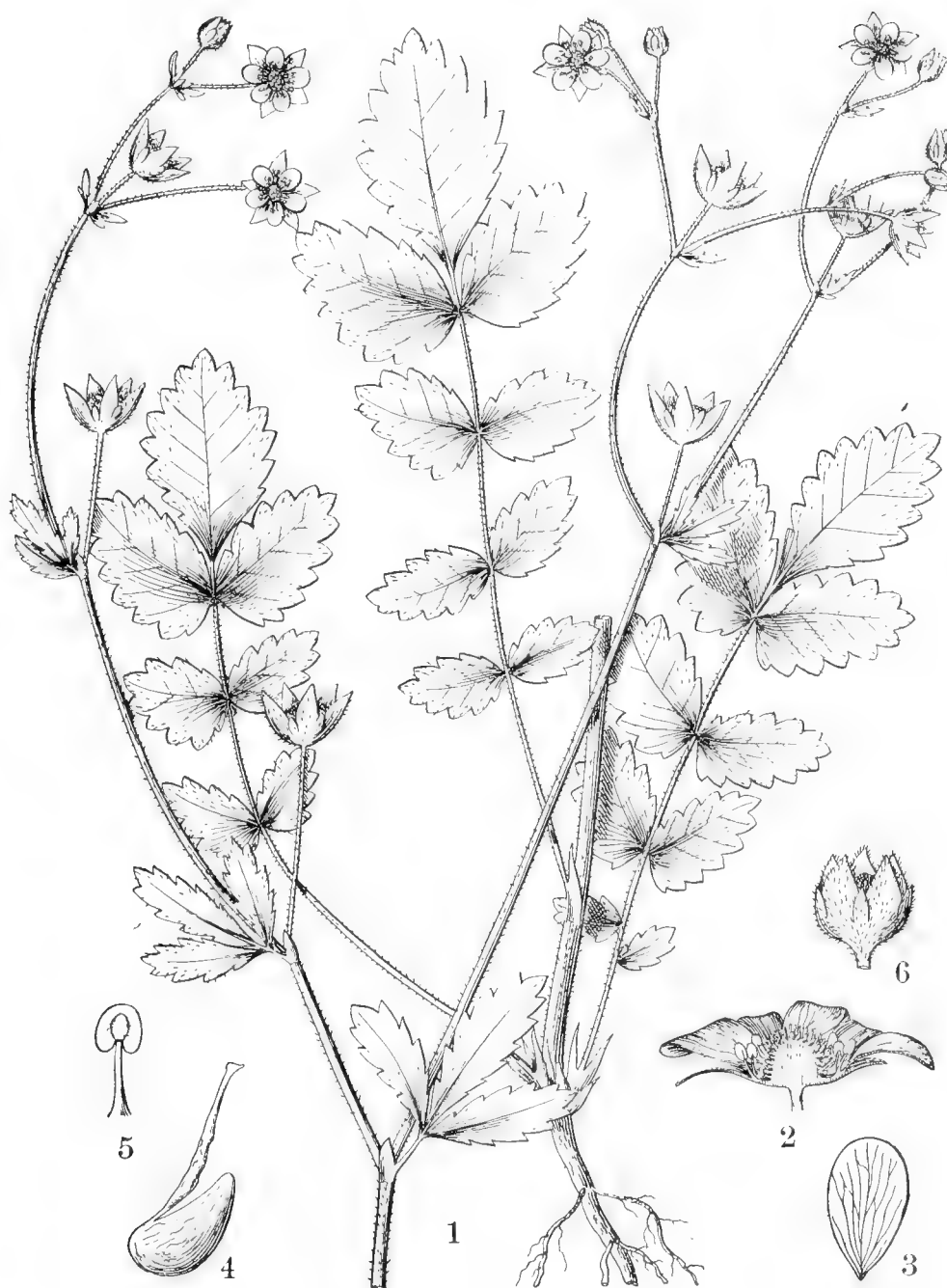
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DRYMOCALLIS WRANGELLIANA



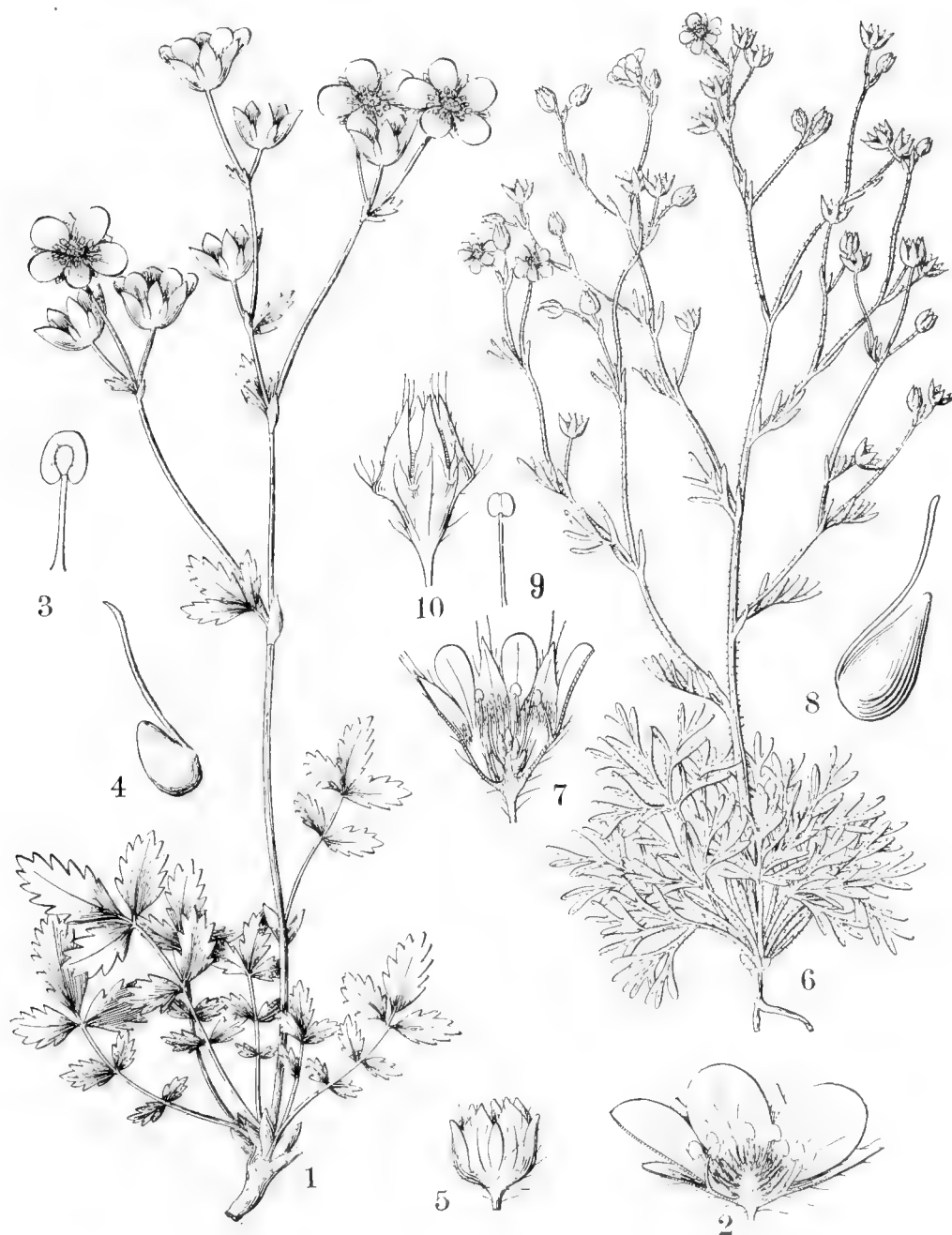
DRYMOCALLIS GLABRATA



DRYMOCALLIS REFLEXA



DRYMOCALLIS CUNEATA



1-5 *DRYMOCALLIS RHOMBIFOLIA* 6-10 *CHAMAERHODOS ERECTA*

3 5185 00071 74

